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INTERNATIONAL



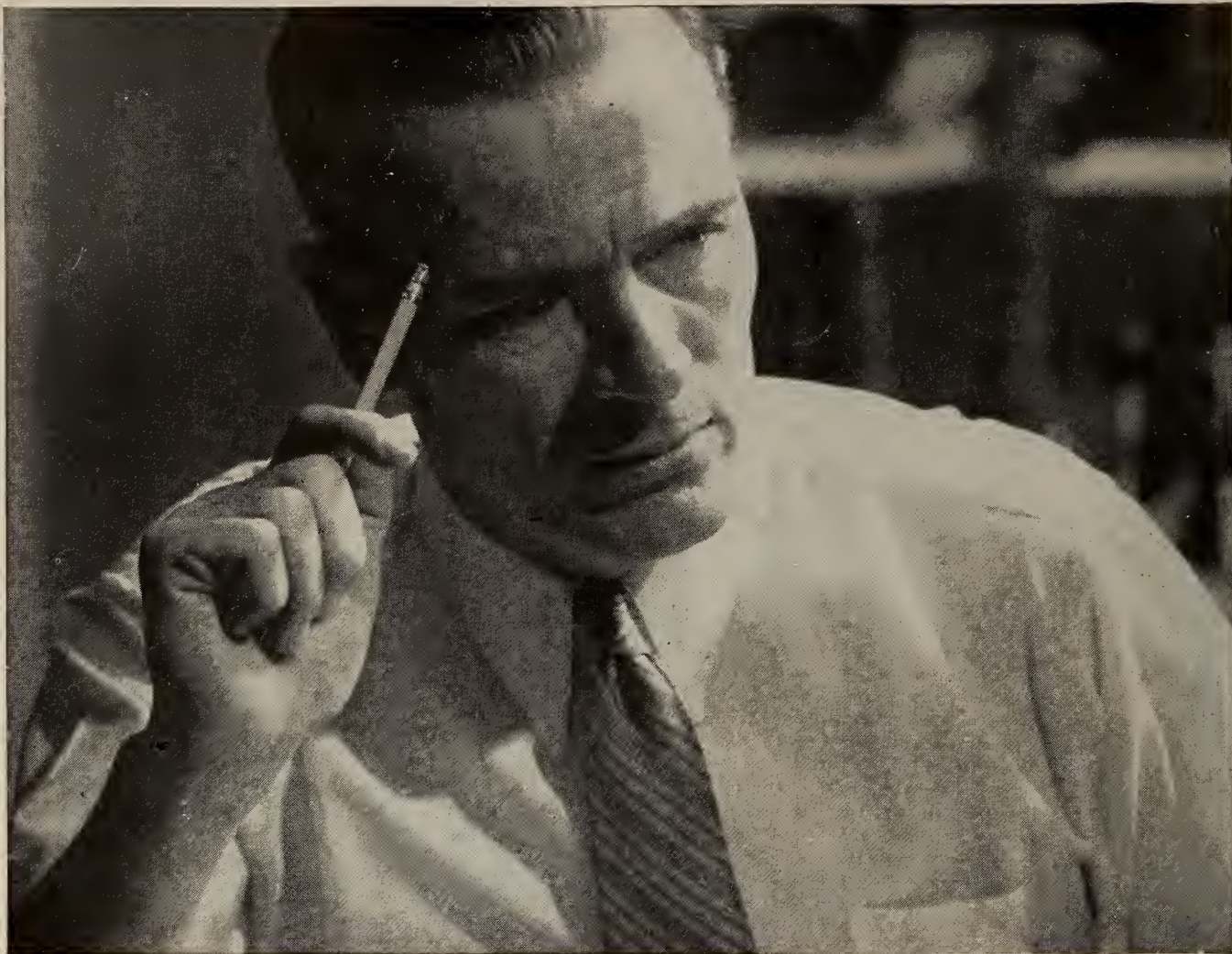
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JANUARY

1948

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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING



HENRY B. SELLWOOD, *Editor*

Volume 23

JANUARY 1948

Number 1

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MONTHLY CHAT

BARRING such cataclysmic upheavals as the sudden introduction of sound motion pictures in 1926 (the result of liberal borrowing from various branches of science which had long been under cultivation by earnest workers in the arts) progress in any field is strangely insidious and is practically imperceptible to those who daily pursue a given calling.

This is especially true of the motion picture field today, since the trend since 1926 has been in the main a process of refinement of both equipment and technique rather than one which served up at regular intervals the new and novel. Any projectionist—even he who prides himself on keeping fully informed anent developments in his profession—would he likely to mark off the past year as one singularly devoid of any startling technological advances in the film world.

Just how wrong is such an estimate may be gleaned from a perusal of the review of happenings in the film technical field which appears in this issue. True, with the single exception of a new approach to the problem of more effective carbon arc control, there were exploded no technological bombshells. But even he who reads as he runs cannot fail to gain from this summary a definite impression of the never-ending, almost month-to-month advances registered.

But the significance of the record for 1947 to Mr. Projectionist lies in the old adage that progress is the promise of today that becomes an actuality tomorrow. Just ponder the doings in 1947 relative to television (in our opinion tomorrow's tough competition to the theatre box-office); to new light sources; to the constant upping of amperage levels for the carbon arc; to the vital work now going forward on three-dimensional motion pictures; to projector mechanisms—with a better than fair prospect that 1948 will witness the introduction of at least one new 5-to-1 movement; to simplified color films, to acetate film stock—there is no end of promise for the discerning eye and the imaginative mind.

These developments have very definite implications for projectionists, and particularly for that group which, immersed in the mechanics of daily routine, tend increasingly to regard the projection process as static rather than as the truly dynamic art that it is. IP for its part promises to maintain its traditional alertness for any happening which promises to affect the art or the craft; and it hopes that its example will be reflected in an enhanced degree of receptivity to new ideas on the part of the craft.

After all, it's the devil we don't know rather than he whom we do know that wreaks the most damage.

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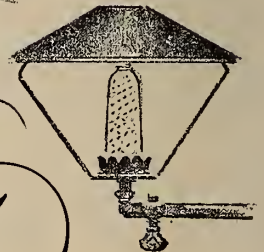
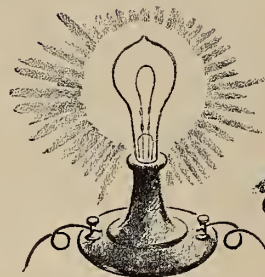
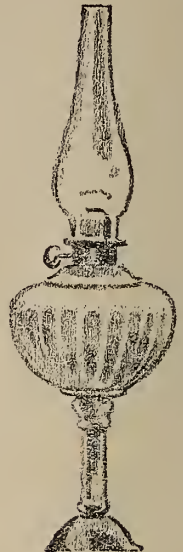
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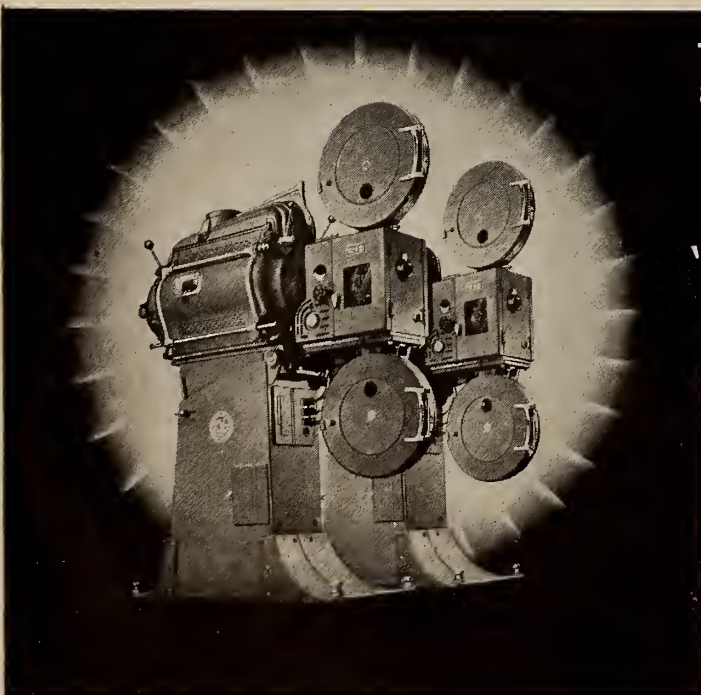
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Factors Affecting Image Steadiness

THE term *unsteadiness* as applied to a projected picture signifies the presence of undesirable movement of the image as a whole. *Rock-steadiness* denotes the absence of this superfluous motion. [*Flicker*, fluctuations of illumination, is an entirely different matter.] Unsteadiness of the picture image is analogous to flutter in sound reproduction.

The conscientious projectionist, ever on the alert for an unsteady picture, directs his attention to the edges and corners of the screen image where traces of undesirable movement are first perceived.

Because several distinct varieties of unsteadiness are possible in a motion picture, the ability of the projectionist to recognize them is prerequisite to forming a true diagnosis. Not every instance of unsteadiness can be corrected by the projectionist; the trouble sometimes lies in the prints. Where the film is not at fault, the trouble may be remedied by the projectionist. Here are eight general types of picture unsteadiness:

1. Mis-register blur.
2. Rapid regular trembling.
3. Slow regular up-and-down "hunting".
4. Rapid irregular up-and-down jumping.
5. Slow irregular up-and-down creeping.
6. Slow regular sidewise swaying.
7. Rapid irregular sidewise jiggling.
8. Slow irregular sidewise weaving.

It is possible for any of the eight types of unsteadiness to be inherent in the film. Where the impressed picture images are at fault, the trouble may have originated

By ROBERT A. MITCHELL

either in the photography or in printing. These factors are beyond the control of the projectionist.

Worn Film Frequent Offender

Worn film frequently offends because of torn or mutilated perforations. Old shrunken film may produce a "creeping" picture when projected on a machine the framing device of which is a moveable roller interposed between the gate and the intermittent sprocket. The "overshooting" of new (green) prints may be obviated by radical readjustment of gate tension or by "oiling," which, incidentally, is not considered good projection practice.

1. MIS-REGISTER "BLUR" is an out-of-focus effect produced by failure of the intermittent movement to register each frame of the film in its exactly correct position over the aperture. This trouble is sometimes evidenced by a kind of double-exposure effect—a haze or fringe on the top and bottom of objects in the picture. (Use judgment in distinguishing this fault from true travel ghost.)

Causes: Damaged or imperfect star-wheel; worn bearings in single-bearing intermittent movements; incorrect gate tension in poorly designed projectors employing a "framing roller" between intermittent sprocket and gate. Rarely, unevenly worn intermittent sprocket teeth.

2. RAPID REGULAR "TREMBLING" having a 4-frame or 1/6-second cycle is usually up-and-down; never sidewise exclusively, but sometimes slightly rotary or "rock-

ing". The amplitude of the motion is ordinarily small, but its great rapidity makes it an extremely annoying fault.

Causes: The periodicity and frequency of the motion indicates trouble in the intermittent unit, such as a bent or sprung shaft; off-center intermittent sprocket; damaged star-wheel, or worn intermittent roller-pins in Powers projectors. Sometimes caused by an off-balance soundhead flywheel which introduces vibration of the whole projector.

3. SLOW REGULAR UP-AND-DOWN "HUNTING" is said to occur when the picture regularly and slowly drifts up and down the screen, or else gives convulsive jumps at regular intervals. The frequency usually lies within the range of a period of revolution of a reel turning in the projector.

Causes: The trouble usually lies in the film, being introduced in the printing process. Rarely, a carelessly wound or off-balance reel of film shown on a projector having insufficient hold-back tension on the upper magazine shaft and an improperly supported base, the entire mechanism being given a jerk at each turn of the reel.

4. RAPID IRREGULAR UP-AND-DOWN "JUMPING." This is the most common type of unsteadiness in projection. The jumping of the picture may be slight or pronounced, but it is always "jiggly" in character. Some side-weave may be present, imparting a rocking effect.

Causes: Excluding print defects, the chief causes are incorrect gate tension; worn tension pads of the film-trap door; misalignment of the intermittent sprocket

shoes; loose intermittent bearings; backlash between star and cam; looseness of the intermittent unit in framing ring, or looseness of the framing ring itself.

Incorrect Gate Tension

[NOTE: Incorrect gate tension is most frequently to blame. Adjustment of the tension is rather troublesome on the older projectors, but the latest models provide means for convenient manual adjustment of gate tension while the projector is in operation.]

5. SLOW IRREGULAR UP-AND-DOWN "CREEPING." This fault may be distinguished from Type 3 by its more or less irregular character.

Causes: The defect is usually inherent in the print, either by printing from a shrunken negative, or by uneven shrinkage of the print itself. In the latter case the creeping is most marked when the film is projected on machines employing an interposed framing roller.

6. SLOW REGULAR SIDEWISE SWAYING takes the form of a periodic side-to-side shifting of the picture image, sometimes with a convulsive sort of movement.

Causes: In most cases the print has been rendered faulty by inefficient printing, or by slight variations in its width, induced possibly by the accidental shearing of an edge. Injudicious oiling of a new print causes it, but the effect disappears after about six runs. When the projector is at fault, it may be due to bent guide-roller flanges, particularly the stop-end flange (the one toward the operating side).

Sidewise 'Jiggling,' Weaving

7. RAPID IRREGULAR SIDEWISE "JIGGLING" sometimes becomes a stubborn difficulty.

Causes: Usually the print. Also worn (grooved) guide rollers; incorrect or uneven gate tension; misalignment of intermittent sprocket shoes, and end-play in the intermittent sprocket shaft.

8. SLOW IRREGULAR SIDEWISE WEAVING is similar to Type 6, except that no regularity is discernible in the motion.

Causes: Very often the print is responsible in the ways mentioned for Type 6. In other cases, bent or damaged guide-roller flanges; incorrect or uneven gate tension; misalignment of intermittent sprocket shoes; misalignment of the entire film track (producing a tendency of the film to "pinch out" at one or the other of the guide-roller flanges); end-play in the intermittent sprocket shaft.

More complicated motions of the picture image may be regarded as a resultant of two or more of the aforementioned simple types.

In the case of an occasional fit of jumping where the film is not suspect, the projector is probably being affected by vibrations transmitted through its support. A

loose lens mount may also throw the picture into a series of jittery movements.

How can the projectionist tell whether the film or the projector is producing unsteadiness in the picture? In cases of slight, barely perceptible unsteadiness this may be difficult. If a projector consistently gives unsteady pictures with all types of prints, the projector is at fault; if only with new or nearly-new prints, the projector probably is again at fault; if only with an occasional print, new or old, the film probably is the offender.

Trouble-Shooting Measures

Twelve trouble-shooting guides for tracking down the cause of picture unsteadiness are offered herewith.

A. Check the projector base and frame for looseness and susceptibility to vibrations. Also inspect the lens and lens mount for looseness.

B. Check film loops, and revise your threading habits if you have consistently been making them the wrong size. (An upper loop made too large may cause unsteadiness; an oversize lower loop has less effect, but is very noisy.)

C. Check alignment of the film track. (A slight twist in a loop indicates that the film course is out of alignment.)

D. Check tension and condition of film-trap door tension pads. (Lose no time in replacing worn pads. See that the tension is the same on each side of each set, and provide appreciably greater tension for the set of pads over the aperture than is exerted by the upper set. Employ sufficient tension to avoid "over-shooting" on almost-new prints.)

E. Check guide rollers for wear and damage and observe their rotation when projector is operating. Immediately replace bent or scored flanges. The moving film should cause guide rollers to revolve; if they fail to do so they will become grooved.

F. Check guide rollers for lateral posi-

tion. The stop-collar, not the pivots, is used for this adjustment.

G. Check alignment and tension of intermittent sprocket shoes. These should rest lightly against the face of the sprocket when the gate is closed with no film in machine, but they must be adjusted laterally so as to clear the teeth.

H. Check intermittent sprocket for worn teeth. A magnifying glass may be used, or a sharp knife blade may be passed gently over the underside of a tooth—a "click" indicates a notched tooth.

I. Check intermittent sprocket and shaft for wobble. If such be detected, get a new sprocket, shaft, and star-wheel.

J. Check the intermittent sprocket for backlash and end-play. End-play is eliminated by adjusting the collar of the outboard bearing of double-bearing movements, but it is possible to get it *too* tight. Backlash is best corrected by removing the intermittent unit and then dismantling and re-assembling the unit. When testing the star-and-cam adjustment remember: (1) that no appreciable backlash must be felt at the sprocket when in the locked position; (2) the flywheel must turn freely, and (3) there must be no serious binds or sharp "clicking" when the sprocket just starts to turn. Proper adjustment of an intermittent movement requires judgment and a delicate sense of touch.

K. Check the starwheel and cam for wear and damage. Do not hesitate to replace these parts even if only the slightest trace of damage is apparent. They are the heart and soul of the projector.

L. Check the hold-back tension of the upper magazine spindle shaft. An unbalanced reel of film must be restrained by tension adequate to eliminate film slapping. This tension also serves to prevent film pile-ups if the projector is stopped during the running of a reel.

In Case of a Projection Room Fire—Don't Do This!

IP is in receipt of a press release from the Fire Protection Institute, of New York City, which all projectionists are urged to read—just so they may do *precisely the opposite* of what is recommended therein. The release follows:

A projectionist at the Madison Theatre, Madisonville, Ohio, made an unexpected change-over recently. In the middle of a reel, the film in one of the machines suddenly jammed and caught fire. Acting quickly, the projectionist changed to the other projector. While the audience watched the show in complete ignorance of the blaze, he summoned the fire department and then fought the blaze with a fire extinguisher.

Patrons remained unaware of the

trouble until the fire companies arrived.

Quite apart from the incredible dexterity exhibited by the projectionist in changing-over "in the middle of a reel" so that the patrons remained unaware of any untoward happening (is Hollywood continuity *that* bad?), it is incomprehensible to IP how any outfit purporting to be "in the know" could issue stuff which runs directly counter to the long and bitter experience no less than the specific instructions of every competent motion picture technical agency.

Pull the arc switch, drop the ports, light the house lights—and get the hell out of the projection room! That's the ticket for any projectionist who wishes to continue living.



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No other light source for film projection can match the almost perfect color distribution found in "National" High Intensity Carbon arcs. No other "point source" packs so much light into a small area. For example, the quarter square inch area in the positive crater of a 170-ampere High Intensity arc emits more light than 75,000 brightly burning candles. Your patrons get excellent color and clear bright visibility. They like it!

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Lead-Sulfide Photoconductive Cells†

By R. J. CASHMAN

Northwestern University, Evanston, Ill.

These cells, developed during the war, exhibit a much higher signal-to-noise output and a lower impedance than do the caesium cells now generally used. Cell noise is not increased by background radiation. Frequency response is excellent and the sensitive surface is undamaged by high light levels. The high infrared sensitivity of these cells permits the use of an indirectly-heated exciter lamp operating with an ordinary 60-cycle filament transformer. Radio frequency or d-c heating of lamps is thus not required.

THE detector used with optical sound tracks has been almost exclusively the cesium-oxygen-silver photoemissive cell. The selenium-photovoltaic cell, such as is used in the modern exposure meter, has had limited use, particularly in Europe, but the high capacitance and consequent poor frequency response has prevented its use in high-fidelity sound systems.

Recently, the so-called blue-sensitive photoemissive tube made with a cathode of cesium-antimony alloy has been used as a detector by several investigators. Unfortunately, the extremely high sensitivity of this tube in the blue and ultraviolet is almost exactly offset by the feeble output of these radiations from tungsten-filament exciter lamps. The development of an exciter lamp with a high output in the blue region of the spectrum would make the performance of the cesium-antimony phototube much more impressive.

Two new photoconductive cells made of thallous sulfide and lead sulfide have been recently released by the Government.¹ These cells were developed during the war at Northwestern University largely under contract with the Office of

Scientific Research and Development.

The lead-sulfide cell is particularly adapted for use in sound reproduction by virtue of its high sensitivity, low noise, low impedance, excellent frequency response, and general sturdiness in the presence of background radiation.

Characteristics of Cell

A detail drawing of one type of lead-sulfide cell is shown in Fig. 1. The lead sulfide is located on the inner wall of the envelope between the parallel conducting strips. The area of the sensitive surface depends on the application. For most sound systems areas of $\frac{1}{4} \times \frac{1}{4}$ inch to $\frac{1}{2} \times \frac{1}{2}$ inch are satisfactory.

The resistance (in the dark) of the cells may be varied from about 0.1 to 10 megohms, depending on the geometry and method of construction. Since no internal structure exists inside the tube, internal microphonics are almost nonexistent.

The spectral response of the lead-sulfide cell is shown in Fig. 2. For comparison purposes the spectral characteristic of the cesium-oxide-silver phototube is shown. Ordinates are in arbitrary units.

One of the most outstanding characteristics of the lead-sulfide cell is its high infrared response. It will be observed that in comparison to the threshold posi-

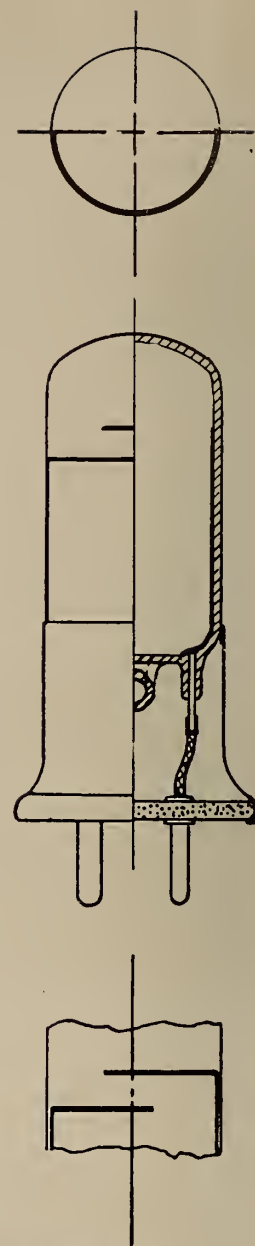


FIG. 1. Lead-sulfide cell.

tion at 1.2 microns for the cesium-oxide-silver phototube, the lead-sulfide cell responds over a range of three octaves farther down in the frequency spectrum to 3.6 microns. The response from 2.5 to 3.6 microns is decreased somewhat by the absorption of the glass envelope.

Frequency Response

A typical frequency-response curve from 30 to 10,000 cycles is shown in Fig. 3. The modulated flux used for these data was 1 microlumen from a tungsten filament at 2870 degrees Kelvin. The polarization voltage applied in series with the cell and equal load resistor was 45 volts. The decrease in response at 10,000 cycles, which in this instance, is about 7 db, is caused partly by the capacitance of the cell, base, socket, and connecting leads.

Under identical test conditions cesium-

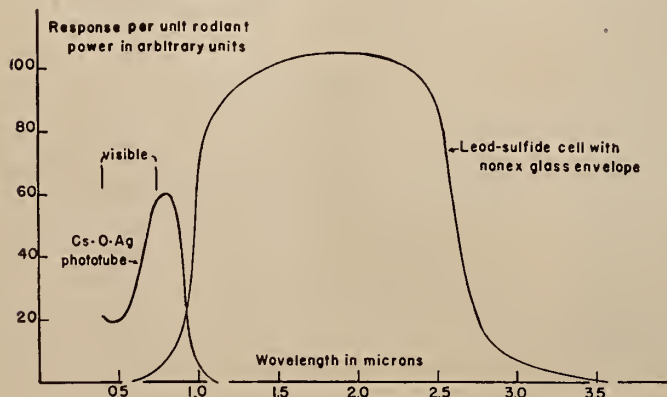


FIGURE 2.
Spectral
response
of
lead-sulfide
cell.

¹ CASHMAN, R. J.: *J. Opt. Soc. Amer.*, 36, 356A (1946).

† *J. Soc. Mot. Pict. Eng.*, Oct. 1947.

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This new Western Electric Intermodulation Measuring Set, successor to the original intermodulation meter introduced by Western Electric nearly ten years ago, is designed to meet the exacting needs of the motion picture industry.

The RA-1257 Intermodulation Analyzer provides a single, direct meter indication of percentage intermodulation. It will operate on signal inputs as low as -30dbm , eliminating the need of a booster amplifier with its attendant intermodulation.

The phase meter included in the Analyzer indicates whether distortion is occurring in the positive or negative half of the signal, thus doing away with the need for a separate oscilloscope. Individual filters for the 2,000 cps and high frequency measuring circuits prevent objectionable noise from being introduced.

The single, stepless input control on the Analyzer

provides the operator with one-hand control, leaving the other hand free to operate the multiplier on the percent intermodulation meter.

The RA-1258 Intermodulation Signal Generator provides a signal of two frequencies, the low between 40 and 150 cps and the high either 2,000 cycles or between 7,000 and 10,000 cps. Because the generator is capable of an output of $+23\text{dbm}$, no additional amplifier, which might introduce its own intermodulation, is needed. The amplitude ratio between high and low test signals can be set at 1:1, 1:2, 1:4 or 1:10, making available extremely high accuracy when desired.

Designed primarily for the control of film processing in motion picture work, this Intermodulation Measuring Set is a valuable tool in many fields where audio frequencies are employed. Write today for full information on the system.

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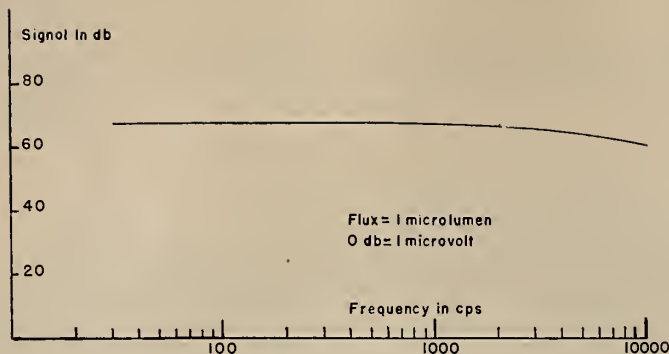


FIGURE 3.
Frequency
response
of
lead-sulfide
cell.

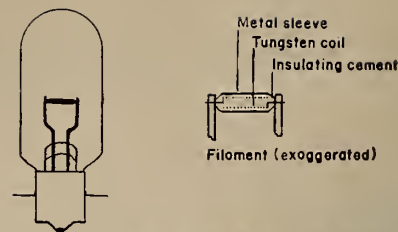


FIG 5. Indirectly heated exciter lamp.

oxide-silver phototubes deliver a signal 15 to 30 decibels lower over this range of frequencies.

The noise generated consists of two parts, namely, thermal or Johnson noise and current noise. For the polarizing voltages normally used in sound reproduction (45 to 90 volts) the total cell noise is not more than a few db above 1 microvolt.

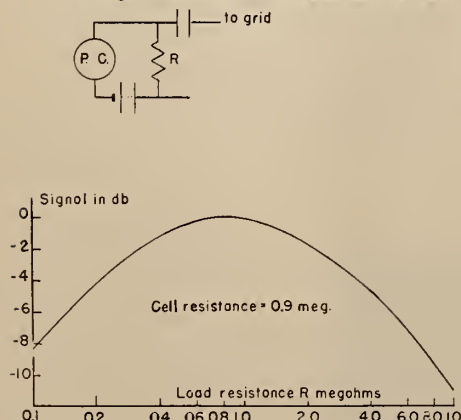
Actually the noise generated is a function of the area of the sensitive surface and varies inversely with the square root of the sensitive area. The signal-to-noise ratio for a constant flux varies with area in the same way. Therefore the cell area should be no larger than is required by the optical system. The current part of the noise is also frequency dependent and decreases with increasing frequency.

Response vs. Illumination

The response varies linearly with illumination up to values of 20 to 40 foot-candles and thereafter seems to follow a square-root relation. When background illuminations are present from sources rich in the infrared, the signal output is decreased somewhat. In contrast to photoemissive cells in which the noise increases with background illumination, the noise from the lead-sulfide cell is lowered.

The variation of signal output with load resistance for a constant input flux is shown in Fig. 4. Although optimum signal is obtained with a load resistance equal to cell resistance, the former may

FIG. 4. Signal versus load for lead-sulfide cell.



be varied considerably without a large decrease in signal. This characteristic may be utilized in sound systems without preamplifiers located near the cell to improve the over-all frequency response.

By using a low-impedance input the effect of capacitance shunting at the higher frequencies may be reduced and a relatively long connecting cable to the

amplifier may be used.

The high infrared response of the lead-sulfide cell enables it to respond to sources of radiation at much lower temperatures than was possible with any previous photoelectric cell. In view of this characteristic an indirectly heated excited lamp has been developed in which the heating current is supplied by an ordinary filament transformer.

The details of one type of lamp are shown in Fig. 5. A lead-sulfide cell oper-

(Continued on page 26)

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

XI.

WHILE workers in America, particularly the skilled craftsmen, had been gaining faith in their form of organization despite the reverses they had suffered, a basically different understanding of labor's major problem and the policy required to deal with it had been gathering force and vigor, with Germany as the center.

There had been a deep stirring of the mind among the German masses. They were beginning to realize that the ruling groups, with their special privileges based on birth and the ownership of the land, made them the victims of a heartless exploitation. This led to the so-called revolution of 1848.

Something else also happened that influenced many workmen like a call from the mountaintops and a vision of the promised land. Karl Marx and Friedrich Engels issued the Communist Manifesto, which ever since has been economic gospel for Socialists and the more extreme group, the Communists.

Among those surrounding Marx were men who would not have hesitated to apply armed revolution for the overflow of "capitalism," but that was obviously hopeless in view of the government's control of the army and of the arms, provisions and financial resources against which no revolution could be successful.

German Socialist Movement

The German Socialist leaders looked for their success to the widespread accep-

tance of their program, and its progress through legislation. They worked to establish political control instead of planning to apply armed force. For this reason socialism became a political movement.

The leaders of German socialism sought to build up their political movement as rapidly as possible. Instead of endeavoring to assist in the organizing of a far-reaching trade union movement they opposed those who endeavored to build up in Germany something similar to the vigorous, militant trade union movement of Great Britain.

A few of the prominent Socialists who were also workmen insisted upon organizing in the industrial as well as the political field. A leader in this group was Alexander Schlichte who, in time, organized the Metal Workers Union of Germany, the largest union in the world before all the German unions were ruthlessly destroyed by Hitler.

Backed by Intellectuals

The intellectual leaders of socialism feared that trade unionism would work to divide German workmen, for if they developed confidence in the ability of their unions to give them an immediate relief from some of their grievances, it would lead them to take less interest in socialism's political efforts. There was sound logic in this reasoning.

The early leaders of Germany's trade union movement, all of whom were So-

(Continued on page 28)



Through him . . . West meets East

ACROSS his "front page" the world parades . . . before the eyes of moviegoers on Main Street. There, West and East *do* meet—through the highly specialized efforts of the newsreel editor.

He sifts the facts and foibles of the world . . . and presents in one short reel the significant, the human, and the odd—the news that helps the world to know itself.

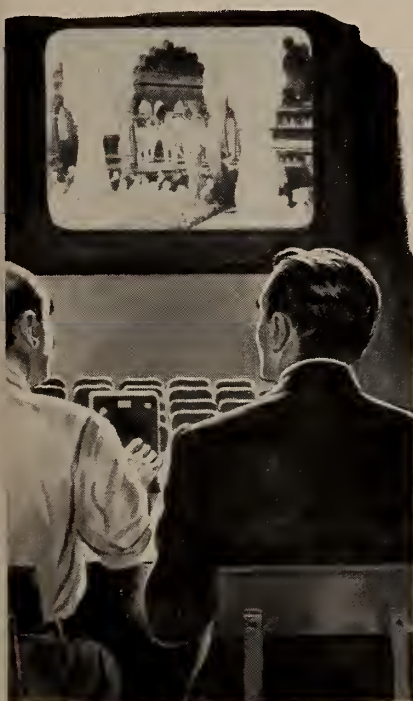
To his objectivity . . . his sense of the newsworthy . . . his feeling for concise and graphic storytelling . . . the newsreel owes its unique place in American journalism.

Yet the newsreel editor would be the first to give due credit to his staff of cameramen . . . and to the Eastman motion picture films which help them cover the news—and help him present it so effectively.

EASTMAN KODAK COMPANY

ROCHESTER 4, N. Y.

J. E. BRULATOUR, INC., DISTRIBUTORS
FORT LEE • CHICAGO • HOLLYWOOD



Projection Equipment, Technique in '47

Year Marked by Refinement of Existing Units,
Procedure Rather Than Any Innovations

IN 1947 the sound-film projection field witnessed in the main a conscious effort on the part of both manufacturers and projectionists to effect refinement of existing equipment and technique rather than, with one notable exception, the introduction of any radically new or novel units or methods of procedure. The exception was the delivery on a widely scattered front of the first Forest Electronic Lamps which feature a brand new approach to the problem of more exact arc control.

Advances scored during the year, not necessarily in their order of importance, might be summarized as follows:

1) further deep inroads on the low-intensity lamp camp by lamps of modern design utilizing Suprex carbons;

2) the steadily increasing use of the fine fast projection lenses now available;

3) the emergence of several bi-pack color systems which reflect more the inability of Technicolor to service all its eager customers rather than any stiff competition to the latter process;

4) the sensational outpouring of 16-mm equipments on all fronts—theatrical, school, and industrial;

5) definite indication that acetate stock will gradually supplant nitrate film as soon as expanded production facilities, now in work, are available;

6) the widespread gains chalked up by television in terms of receivers produced and sold, in programming, and in the extension of both coaxial and ether relay network facilities, and

7) intensive work by National Carbon Co., and also by inkie manufacturers, to produce more powerful and more efficient sources of screen illumination, with the former being faced with the concomitant

The new Strong 16-mm high-intensity d. c. carbon arc lamp, shown with its associated Tungar bulb rectifier equipment.

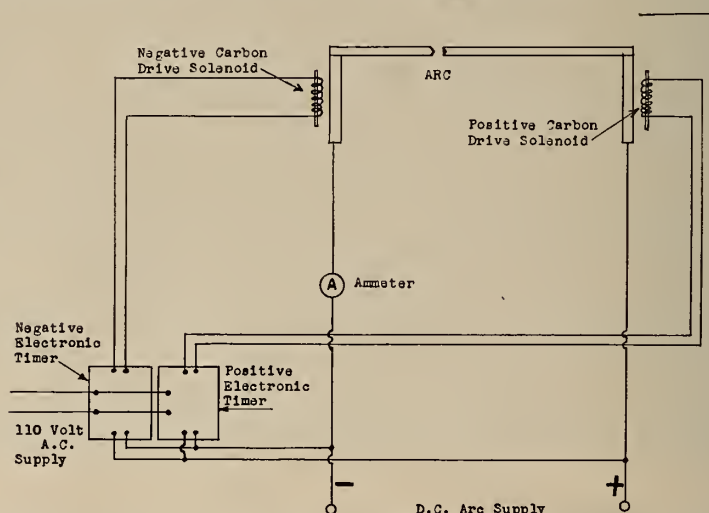
By HENRY B. SELLWOOD

necessity for simultaneously developing an effective cooling agent for lamp units, gate, and the film stock itself.

16-mm Gains Outstanding

If one were pressed to name the outstanding development in projection during 1947, the palm would have to be awarded unhesitatingly to the 16-mm manufacturers. These fellows went absolutely hog-wild in flooding both the domestic and foreign markets with their product, and there is every indication that

Schematic wiring diagram for the Forest electronic projection arc lamp.



their furious distribution pace will see no abatement during 1948.

A recurrence of the years'-old assertion that 16-mm equipment had "at last" reached the stage of development where it could seriously challenge the results obtained with 35-mm units proved to be merely wishful thinking on the part of the sub-standard enthusiasts, despite the excellent showing made by at least two 16-mm units unveiled at the year's end.

A resume of film technical developments in 1947, pretty much in chronological order, is appended hereto.

Cinecolor, Trucolor, and Magnacolor prints began to reach theatre projection rooms in ever-increasing number. These processes benefited by reason of their comparative simplicity and through the inability of Technicolor to sate the voracious appetite for color evinced by producers of shorts as well as features. Trucolor, controlled by Republic Pictures, has a corner on all available acetate stock until well into 1948. Technicolor itself

announced a 25% increase in production over the preceding year.

First deliveries of the Forest Electronic carbon-arc lamp were effected here and abroad. This unit, requiring innumerable fewer parts than the conventional arc lamps, introduced a wholly new principle of carbon feed actuated by solenoids which in turn are impelled by a Thyatron tube.

Trivision System; Magnetic Recording

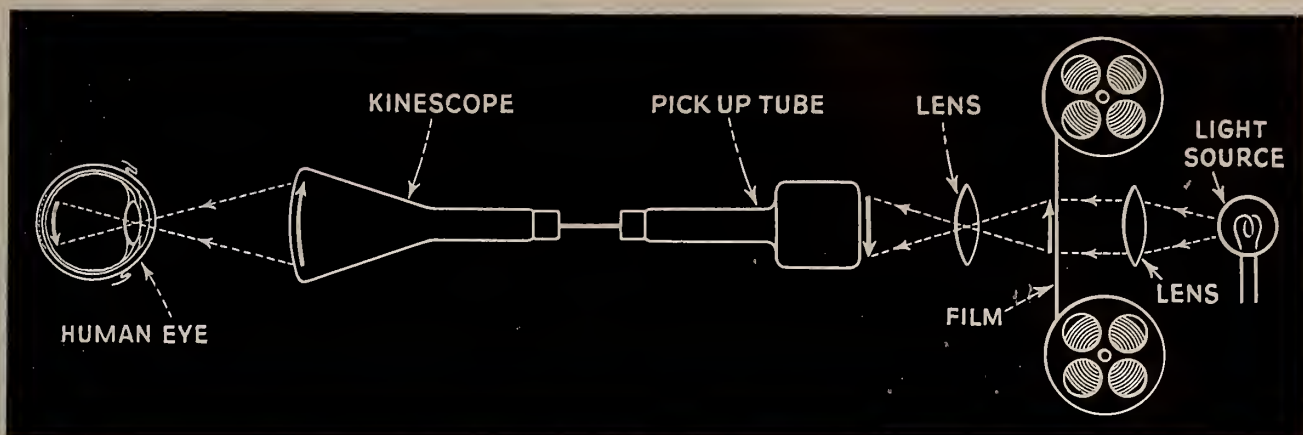
Details of Trivision, a single-lens system for stereoscopic still pictures developed by Douglas F. Winnek, were revealed following extensive hush-hush use

of the process during the war years. This system uses an $f:2.2$ coated lens $14\frac{1}{2}$ inches long and 8 inches in diameter. Utilizing any standard film, the process entails embossing the stock with ridges or lenticulations, to the extent of 200 per linear inch, each of which acts as a separate miniature lens and divides its portion of the image into two parts. The camera moves across (scans) the film laterally.

Pictures taken with this process, on which the U. S. Navy spent beaucoup thousands of dollars, are nothing short of sensational in terms of absolute stereoscopy. Inventor Winnek promises the early application of the development to motion pictures and television.

Magnetic recording, the basic principles of which were laid down as far back as 1901 by Valdemar Poulsen, was the beneficiary of extensive application during the war and came on with a rush. Thus far its use in the motion picture field has been confined to the studios,



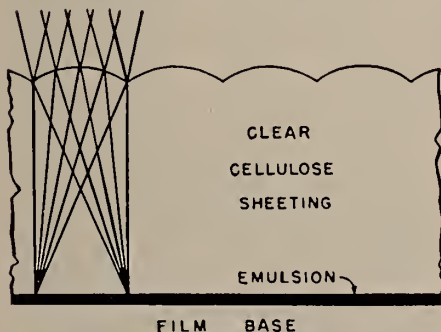


Essential parts of a television system when a filmed scene is to be transmitted and reproduced.

mostly for daily rushes and for instantaneous playbacks.

National Carbon Co. reported progress on its new *experimental* (italics theirs) 9/8 mm Suprex carbon pulling 85 amperes at 50 volts. This is the baby that has the N.C.C. Ph.D.'s tending toward thinning hair because of the pressing necessity for developing some means for cooling the projection elements, including the film, without incurring any serious loss in illumination.

Common carriers—trains, planes and steamships—made a concerted noise publicity-wise about providing sound pictures



Showing path of light rays through the film backing and cylindrical lens embossing in Winnek system of Trivision stereoscopic pictures.

for their passengers. The idea was a positive flop only on planes, since the passengers on ships or trains could either take the films or leave them.

Harry Strong took the wraps off a new high-intensity carbon-arc lamp for 16-mm projection, the first such job to be designed expressly for the sub-standard film. Harry proceeded to clean up with this unit, its superiority over the inkies used heretofore being pronounced. This lamp uses 6/5½-mm carbons, pulls 30 amperes at 28 volts.

Video Scores Wide Advance

RCA breathlessly chased CBS up a blind alley and effectively demolished the latter's mechanical system of color television by demonstrating an all-electronic video system. Patently a stop-gap show

designed to slay CBS, but dead, the RCA setup did well for itself but served to confirm the view of its sponsors that it would require another few years before it would be commercially practicable.

Loren Ryder visited New York in his dual capacity of SMPE prexy and director of recording for Paramount and predicted that theatre television would be an actuality in 1947 in several de luxe key-city showcases. Par officials were credited with idea that unions were retarding the theatre tele by insistence upon handling the "intricate transition" of cathode image to the projection screen. "Trained engineer" preference of Par brass is same gag used by broadcasters to stave off unionization.

Mike Berkowitz, projectionist since 1890 and still an active crack projector mechanic, finally eluded the clutches of well-wishers and relinquished his post as president of the 25-30 Club of New York, which outfit has members throughout the U. S. and Canada.

A 35-mm professional projector, operable on either a.c. or d.c. and reminiscent of the old Powers job in several respects other than its 5-to-1 movement, was demonstrated by Manufacturers Machine Tool Co., Mt. Vernon, N. Y.

The DeForest "Audion" three-element vacuum tube (the third element being the "policeman" grid which effectively regulated the electron flow) was 40 years old in March, 1947. The addition of this small mesh grid revolutionized the communications art and signalled the dawn of the electronic age. DeForest wound up with the usual—much glory and peanuts.

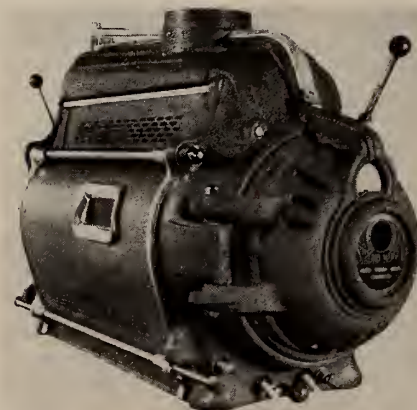
Equipment Potpourri

Karl Brenkert unveiled his new 1 Kw Radarc lamp designed for theatres having screens up to 18 feet. More accurate controls and a very efficient ventilating means marked this job.

Bausch & Lomb embarked on a \$6 million program of plant expansion for the development of new techniques and the production of coated lenses, television optics and plastic products.

"In line" production went into high gear at the new Bloomfield, N. J., plant of International Projector Corp., the transition from the multiple-floored famous 90 Gold St. in N. Y. City having been completed.

Those Local 162 birds comprising the crew at the Geary Theatre in San Francisco laid claim to working with the all-



Strang 1947 model Arclamp, which is proving extremely popular for drive-in theatre use, pulls 70 amperes at 40 volts. Power supply obtained via either of two Strong rectifiers: a 3-phase, 6-tube, 80-ampere job, or one far single-phase power having 4 tubes at 80 amperes.

time-high projection angle of 33 degrees. Nobody disputed the assertion, so those guys got away with it.

Electrons were put to work at a new task in the Bausch & Lomb plant, that of bombarding optical surfaces to clean them better and faster.

Ampro came up with a beauty, its

Showing vast sweep of Simplex factory main floor.



"Premier 20" 16-mm projector for 50-60 cycle, 105-125 volt operation and featuring an $f:1.6$ lens, 1600-foot reel, a 12-inch Jensen speaker, operable at either sound or silent speeds and adaptable for still pictures and reverse operation.

Pre-fab Projection Room

The first completely pre-fabricated theatre, including the entire projection room with all walls, outlets and unit positioning provided for, in advance, bowed in the form of the Crest Theatre at Long Beach, Calif. The house, conceived and executed by R. H. McCullough of Fox West Coast Theatres, also boasted a special elevator for hoisting film from ground floor to projection room. Such airs, these West Coast guys.

Mole-Richardson, hewing to the line that theatres can't show what ain't on the film and joining the parade toward more and then more set, and ultimately screen, illumination, came up with the Type 450 ("The Brute") studio carbon-arc lamp. Pulling 225 amperes at 75 volts and specially water-cooled, this unit provides a 100% increase in light with only a 50% increase of current over the Type 170 lamp pulling 150 amperes.

Ingenious Tele Projector

To compensate for the difference in the scanning rate of film as between theatre projection and television film pickup RCA developed an ingenious projector which converts conventional 16-mm, 24-frame-per-second film to the 30-frame p.s. video rate. Elliptical gears cause the claw mechanism to travel about 50% faster in the downward direction.

It was disclosed exclusively by IP that



Crest projection room, 12 ft. deep by 24 ft. wide, includes Simplex E-7 projectors, Super bases, Magnarc lamps, Simplex sound system (150 watts output), Brenograph effect machine, spotlight, and a separate p. a. system. Note rewind bench with recessed film cabinets illuminated directly above. Fiberglass ceiling is 8 ft., 6 in. high. Room is absolutely noiseproof, air conditioned, and has separate heating system. Projector circuits are plugged to prefabricated front wall panel. Lamps separately ventilated, with room having separate exhaust with outside air intake. Portable ceiling work light between projectors. Huff Orthoscope lens system and port glass.

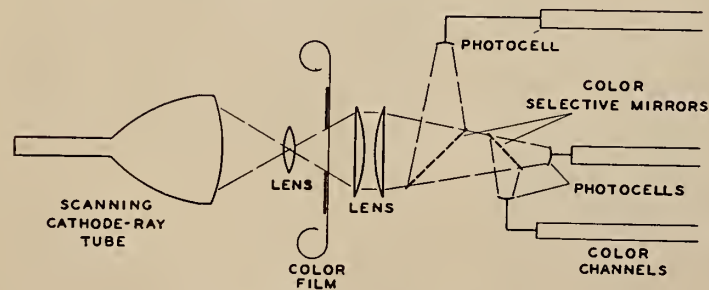
various patents issued to Raymond T. for general projection needs.

Cloud in the '30's and subsequently assigned to International Projector Corp. anticipated in several respects the much-ballyhooed Western Union zirconium-arc lamp which, with the unsuspecting aid of somnolent technical editors, had the motion picture field in a dither for several months. Point sources of light such as the W.U. lamp, while adaptable for sound-filming recording, are unsuitable

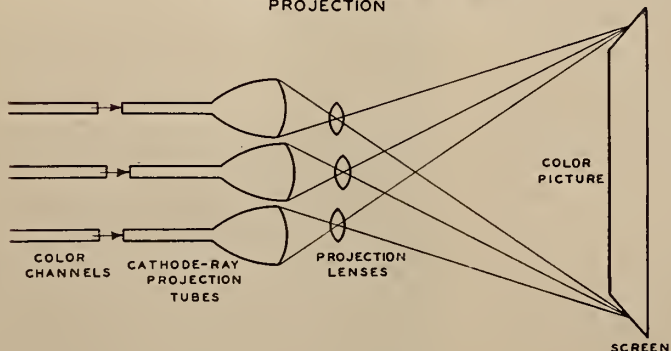
Two valuable projection aids were forthcoming: a sound test reel from Altec Service Corp., and a series of visual projection targets from the Academy of M.P. Arts and Sciences.

A survey of all exchange centers showed that there were more than 800 theatres in the U. S. catering exclusively

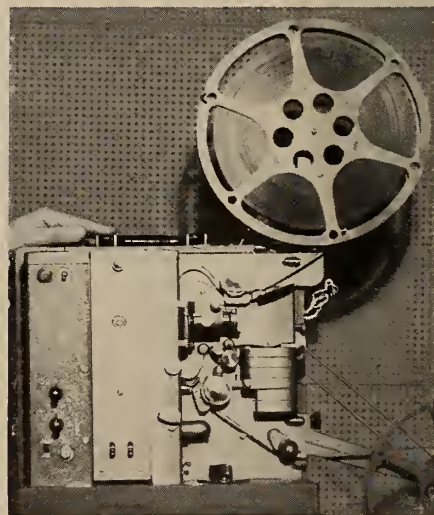
COLOR FILM SCANNING UNIT



SIMULTANEOUS COLOR PICTURE PROJECTION



Block diagram of the simultaneous all-electronic color television system. Each of the color channels, shown at the right of the upper figure, have the same operating standards as the current black-and-white system. At the receiving end, shown at the left of the lower figure, each color channel is associated with its separate cathode-ray projection tube.



The new RCA 201 16-mm projector (sound or silent) used in tele setup.

to Negro patronage, and indications are that this figure will pass the 1000 mark before the end of 1948.

Exhibitors ate four times daily, equipment manufacturers wallowed in heavy, sticky dough, and professional moralists needed civic authorities into not banning but merely taxing incipient sin—all as a result of the tremendous upsurge of

*For Exhibitors
and Projectionists*

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"THERE'S A BRANCH NEAR YOU"

drive-in theatres. Not the best visual image or sound reproduction extant but merely satisfying the great American yen to be anywhere but home, the drive-ins multiplied like rabbits throughout America and dented severely the box-office take of urban theatres.

Nothing startling in the way of equipment or technique in these setups except for screen sizes up to 60 feet utilizing some zany ideas of what constitutes an acceptable reflective surface.

The 0.943 Intermittent Sprocket

Virtual unanimity of favorable opinion was expressed by projector manufacturers anent the new standard 0.943 intermittent sprocket dimension, which was recently validated by the American Standards Association. The vastly improved film shrinkage characteristic permitted the switch from the previous 0.935 standard.

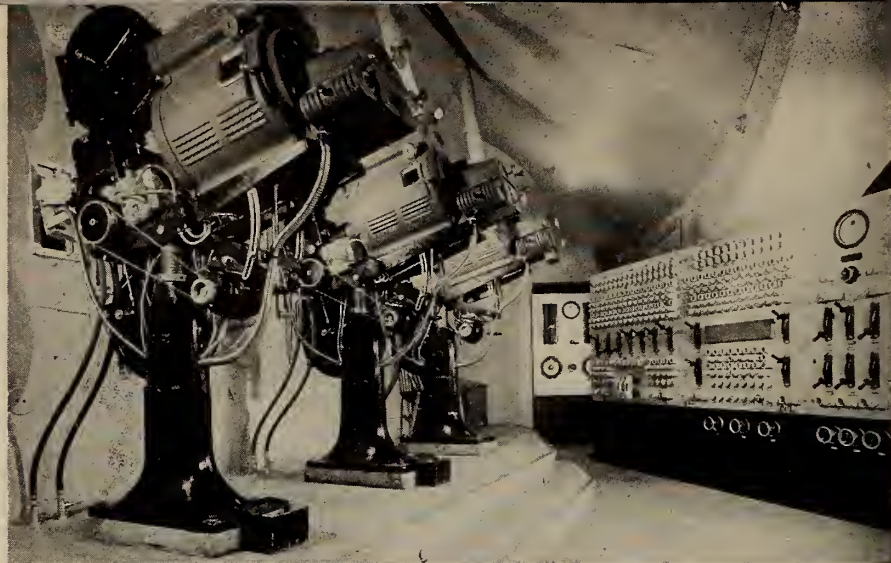
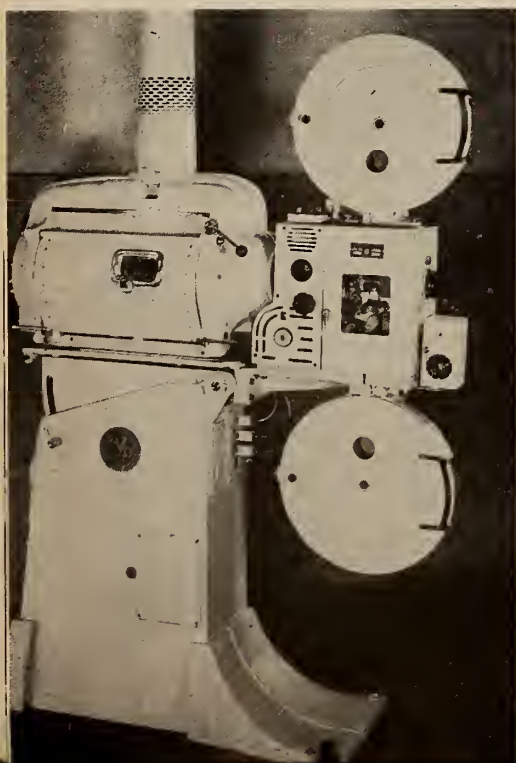
Expressed opinion and manufacturing practice being two different horses, several projectors "cheat" a bit on the low side.

More than 30,000 miles of film was handled daily in major company exchanges during 1947 without injury to a single person or a dollar of fire loss.

Corniest exposition of the year was the statement by an Iowa exhibitor who, in opposing a proposed change in that State's building law affecting theatre projection rooms so as to provide additional safety factors, said the law was wholly unnecessary as far as he was concerned. Reason? Why, the guy claimed that following a recent fire which burned out *only* his theatre's projection room, he now had projection facilities better than ever!

Ampro joined the growing list of American equipment manufacturers who have

The new DeVry '12000' 35-mm projector complete, as viewed from the operating side.



An older but most interesting installation, showing belt-driven Erneman projectors and, at rear right, control panels for all power and light in the theatre. Note spaciousness and cleanliness. (China Theatre, Stockholm.)

set up factories in England so that their products may reap the benefits of British Empire trade. Practically every important projection unit of original American design is now made somewhere in the British Isles.

Throwing a "natural," Harry Strong produced and sold his 25,000th rectifier in his 25th anniversary year as a manufacturer.

Television enthusiasts observed the 20th anniversary of the emergence of the art from the laboratory. On March 27, 1927, there was established a New York-Washington wire over which were transmitted for reproduction on a screen various important political and scientific personages, including then President Hoover.

Following widespread charges that most film damage occurs in the projection room as a result of inefficient projection work, IP advocated the adoption of a standard film report form in duplicate which would protect both the projectionist and the Union from unwarranted bills for film damage.

IP also recommended that projectionists file a written report anent possible defective projection equipment *prior* to running each new show, together with a resume of the physical condition of each print.

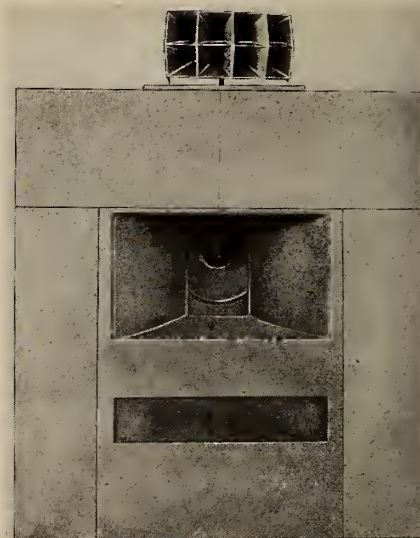
Acetate Prints to Fore

Acetate prints began to appear in increasing number to the confusion of projectionists who discovered that ordinary cement suitable for nitrate stock would not bind acetate film. An alert IP blanketed the field with specific instructions anent the handling of acetate stock and advised checking the edge marking of all prints.

A check list of then current acetate prints was published, and it was emphasized that Republic's Trucolor had a corner on all available acetate stock until well into 1948. The expansion of production facilities, notably by Eastman Kodak Co., will gradually increase the supply of

acetate stock to a point where the total footage will at least equal the amount of nitrate film circulating in the theatre field.

Made available in mid-Summer was the new DeVry "12,000" 35-mm sound-film theatre projector representing the best job ever turned out by this progressive manufacturer.



Altec Lansing '800' Voice of Theatre loudspeaker for auditoriums up to 1000 seats.

Another major advance in power supply units was scored by McColpin-Christie Corp. *via* the introduction of a new six-phase magnesium-copper sulphide rectifier which, developing 720 c.p.s., pared down the ripple content of rectified current to the lowest mark yet attained.

The resumption of large-scale maritime activity opened up not a few professional projection posts which were filled by alert Union officials on both Coasts. At the same time picture shows on planes made a quiet and unlamented exit.

Local 150, Los Angeles, made available to the craft a series of charts which graphically and dramatically plotted the

(Continued on page 22)

The Vitascope Dual-Purpose Projector

By LEROY CHADBOURNE

RECURRING rumors that at least two motion picture producers, in collaboration with the manufacturers of film stock, are conducting extensive tests with film ranging from 50 to 70 mm wide as a means of supplying industry box-offices with an economic shot in the arm, should conditions warrant it, will not down. In fact, it is only the continuing healthy money intake that has prevented a very serious attempt on the part of one major company to test wide film on a broad theatre front.

Projectionists will recall the abortive efforts of the '30's to sell the industry on the merits of wide film which would enable the approximate doubling of the present conventional projected screen images. The Spoor process, Grandeur [backed by Fox Film Corp.] and several other wide-film systems chewed up hundreds of thousands of dollars before the industry awoke to the fact that in sound pictures they had a box-office stimulus that would sell great gobs of tickets for years to come.

Strange it is that one of the most ingenious and practical wide-film systems of that period received practically no publicity, nor was its undoubted merit in terms of inexpensiveness, ease of installation and operation ever accorded the recognition it deserved by the industry's technical forces.

Vitascope a Superb Job

We refer to the Vitascope wide-film system which, sponsored by Warner Brothers, reflected the superb craftsmanship and utter practicality of one of the oldest, in terms of uninterrupted service, and most competent projection practitioners who ever graced the craft.

This craftsman is Mike Berkowitz, expert projectionist and a projector me-

Current tests of wide film systems recall the Vitascope dual-purpose projector of the '30's. This unit, reflecting the superb mechanical craftsmanship of Mike Berkowitz, was distinguished by an interchangeability feature which permitted the showing of both 65- and 35-mm film by the same mechanism by means of dual sprockets on one shaft. The job represented a reconversion of the Regular Simplex head the while retaining the basic drive and intermittent units.

chanic of such attainment that even projector manufacturers send him their overflow repair work. A projectionist since 1890 and a member of Local 306, N. Y. City, Mike was for years president of the famed 25-30 Club of that city.

Fearful lest the impending introduction of the Spoor and the Grandeur systems presaged another revolutionary technical upheaval of smaller but no less significant proportions than sound pictures, Warners in 1930 cast about frantically for a wide-film setup that would preclude their being left at the post.

Most unexpectedly and to their intense relief they found the answer to their problem just a door away from their offices on West 44th Street in N. Y. City in the form of the projector machine shop presided over by Mike Berkowitz.

Mike's reaction and almost immediate action in response to the Warner entreaties was simplicity itself. Disdaining any intensive research program or extensive delving into the prior art, Mike went to work on a Regular Simplex projector head and within an incredibly short time had fashioned a wide-film mechanism which, costing but a small fraction of the heavy money poured into the Grandeur

and the Spoor contrivances, matched if not actually surpassed in terms of simplicity of design and reliability in operation these much-ballyhooed systems.

Interchangeable Film Sizes

In common with almost all technicians of that period, Mike was acutely conscious of the need for interchangeability, the term that had been invested with so much awe for producers and exhibitors by reason of the cut-throat competition then in progress between the major sound system companies. So Mike went his wide-film competitors one better: he laid plans for producing a projector which would run not only wide film of the order of 65 or 75 mm but which, with minor changes that could be made within a minute in projection rooms, would also accommodate standard 35-mm film.

Working entirely by hand and using tools devised by himself out of his vast store of mechanical lore, Mike converted a Regular Simplex projector head for the reproduction of wide film. Parts and alterations necessary for projecting either 65- or 75-mm film were effected.

Certain vital projector parts of necessity were doubled in size, including the film trap, gate, star wheel shaft and the sprocket teeth. While the latter were enlarged their number was not increased. A curved gadget designed to prevent buckling by reason of having the film follow a curved rather than a straight path was provided.

Dual Sprockets on One Shaft

Oddly enough, a regular 35-mm size Clayton takeup was used. Special over-size magazines holding 2,000 feet of wide film were utilized, as were enlarged aperture plates. The projector head naturally required a larger case. While the star wheel shaft was longer, the Regular Simplex size star wheel and cam were used. Two sizes of gates were needed, of course.

The most outstanding feature of this Berkowitz production was the inclusion

Three elements of the Vitascope wide-film system: (left) intermittent sprocket, (center) the star, and (right) feed sprocket. Note duality of sprockets, which are single pieces of machined metal. Star is that of Regular Simplex head with elongated shaft.



on one shaft of both 65- and 35-mm sprockets. The former were larger than the latter, naturally, but were the same in number and the teeth for both film sizes engaged the same number of sprocket holes—four. Use of the Regular Simplex size star meant that the 4-to-1 movement was preserved for both sizes of film.

These sprockets—both intermittent and takeup (see illustration)—were sterling examples of the master mechanic's art. Each sprocket is but one piece of metal, with the original piece of steel weighing approximately 3½ pounds having been machined down to tolerances of about 1/10,000th inch until they weighed but 16 ounces each. The holes shown in the ends of these sprockets were made to decrease over-all weight and effect a better balance.

The transition from the projection of 65- to 35-mm film in the projection room required but a minute because of the novel structure of the dual-purpose sprockets. The substitution of a new gate and a new aperture, the closing of the stage masking to a pre-determined size, and presto! the job was done. It was not necessary to change lenses, even though the wide film image encompassed a screen area of 60 feet and more.

Following the ready acceptance of his first and only model, Mike repaired to the West Coast where he could effect closer liaison with the Warner production staff. It was on the Coast where Mike made his first operable job in less than 2½ months. Everything was set for the big splash—a Broadway showing.

Alternate Size Reels Shown

This event occurred in the Spring of 1931 at the Hollywood (now Warners) Theatre. The picture was "Kismet," starring Otis Skinner. A feature of the presentation was the projection by the same

mechanism of both 65- and 35-mm reels of the same picture for the purpose of ready comparison, thus highlighting the Berkowitz provision for interchangeability of film sizes.

Immediately after the New York demonstration, which was an unqualified success, Mike left for the Warner plant at Muskegon, Michigan, where he proceeded to turn out 50 complete Vitascope projectors in short order, the Regular Simplex mechanism again being used as the basis for the units.

The continuing refinement of the sound-on-film process, plus the foreseeable staggering costs that would be incurred not only for the larger film stock itself but also on both the production and projection ends, sounded the death knell for all wide-film processes—Warners' Vitascope, the Spoor process, and the Grandeur system.

Regular Simplexes Restored

Subsequent to the decision to abandon the wide film system, a further tribute to the mechanical genius of Mike Berkowitz was forthcoming in terms of the ease with which the Vitascope wide-film projectors were reconverted back to their original status as Regular Simplex heads, all basic 35-mm elements having been utilized by Mike.

Wide film may or may not be utilized by the motion picture industry in the future—and certainly not in any dimension exceeding 50-mm—but the passage of time will never eradicate the record of a superb bit of mechanical craftsmanship by an old-time practical projectionist who, going in there and pitching against the best engineering talent that money could buy, certainly came off with no less than a tie score.

That was Mike Berkowitz and his Vitascope wide-film projector.

bers produced by amateur talent. Later this demonstration was given at the Rivoli Theatre in New York.

Mar. 1927: It was reported that five of the big producers were negotiating with G. E. to compete with Movietone and Vitaphone.

1926-'27: The research laboratory of Westinghouse Electric and Mfg. Co., not to be outdone, carried on the development of a system of sound recording, using for its light modulator the Kerr cell based on the principle of the rotation of a beam of polarized light by electrostatic means.

Toward the end of 1927, Paramount released its picture "Wings," with a sound score prepared by the G. E. group. This score was used in several different ways. At the Criterion Theatre, New York, the airplane sounds were taken from disk recordings using a multiple turntable device and synchronized by an operator back stage. The effects were reproduced in other theatres through the use of condenser-discharge devices as well as from a score recorded on film.

Form RCA Photophone

1928: The sound picture work of G. E. and Westinghouse was combined into one system and handled by a new subsidiary of RCA called RCA Photophone, Inc. The variable-density Kerr cell method of recording was dropped, and the variable-area system further perfected under the name of Photophone. RCA Photophone announced to the trade that it had perfected reproducing apparatus and would equip theatres.

Oct. 1928: Shortly thereafter, RCA acquired the B. F. Keith and Orpheum chain of theatres and the FBO Producing Co. A subsidiary was formed called Radio-Keith-Orpheum. Through this producing organization, sound pictures made by Photophone's methods were introduced to the public.

The first efforts along these lines were limited to the presentation of musical accompaniment; the first picture was "The Perfect Crime," which included some dialogue sequences. Important stage plays were acquired by the RKO producing organization, including the very successful "Rio Rita," which they produced as a sound picture.

Feb. 9, 1929: RKO Productions, Inc., announced that they had selected "Radio Pictures" as the trade name for RKO Productions [which was the motion picture producing and distributing unit of the Radio-Keith-Orpheum Corp., sponsored by G. E., Westinghouse, and National Broadcasting Co.].

An affiliation was subsequently effected with Pathe Exchange, Inc., which adopted the RCA Photophone System of recording in the production of sound motion pictures. The first Pathe production shown

(Continued on page 31)

Historical Development of Sound Film†

By E. I. SPONABLE

Twentieth Century-Fox Film Corporation

VII. SOUND WORK UNDER THE RCA SYSTEM

ABOUT 1925 a small group of engineers at Schenectady, headed by C. A. Hoxie, experimented on recording sound on film photographically, using a special oscillograph as the recording unit and making records of the variable-area type. This sound-on-film system was called the "Pallophotophone." Also at this time, Hewlett [a research engineer in the General Electric laboratory] was perfecting his induction-type loudspeakers, and Rice and Kellogg [also G. E. re-

search men] were developing their electro-dynamic cone speakers.

Feb. 1927: During the year 1926, probably stimulated by the work of Western Electric and others, the G. E. group combined their Pallophotophone with moving pictures and held a demonstration at the State Theatre, Schenectady, in February 1927, before a group of newspaper men and engineers. Their system of combined pictures and sound was called the "Kinegraphophone." The demonstration included speech and several musical num-

† J. Soc. Mot. Pict. Eng., April 1947, p. 275.

No stranger to these pages, the author again picks up the drumsticks as chief protagonist for theatre television. Concerned chiefly with the technical rather than the economic aspects of the project, this article, originally appearing in "Television," does nothing to dispel the notion of film people that television will ultimately offer formidable competition to the theatre box-office.

Theatre Television Prospects

By DR. A. N. GOLDSMITH

FOR more than a generation, the motion picture theatre has successfully entertained the peoples of the world. It is but natural that any institution which supplies, through electro-mechanical means, visible and audible entertainment to the peoples of the world should have a major interest in any new and impending medium capable of accomplishing somewhat similar results by different methods. Such a new medium is, of course, television.

Even before the war television groups in America and England, working in collaboration with theatre groups or film producers in some instances, showed a growing interest in television in the theatre.

In the United States, RCA displayed full-size screen pictures in the New Yorker Theatre and was able to prove that equipment and methods, while not yet in their ultimate form, conclusively showed capabilities worthy of serious attention.

Intensive British Effort

In England, the Baird organization placed its equipment in a theatre and showed sports events (for example, horse races and boxing matches) to large and enthusiastic audiences. This organization also gave smaller-scale demonstrations in New York until the outbreak of World War II suspended all such developments.

Also markedly active in England, and to some extent in the United States, was the Scophony organization. It too presented sports events to enthusiastic audiences and, it is said, on a profitable financial basis, (considering such presenta-

tions by themselves and not as a part of a larger development project).

Still more recently large-screen color-television pictures have been shown by RCA. It seems reasonably certain that monochrome or color television pictures can be displayed with adequate brightness and sufficient detail and sharpness in present-day theatres. But crystallization of methods and equipment has not yet been achieved, although some partial standardization is apparently not far removed.

The motion picture theatre owner, present or prospective, is naturally deeply concerned relative to theatre television. If, as seems likely, it can add to audience enjoyment and box-office return, he wishes to include it in his present operations and future plans. However, to do so requires specific information on equipment and methods, and such information is not yet fully available.

For example, there are two basic methods of theatre television under present consideration. They are not mutually exclusive, but their types of equipment and methods of operation are somewhat different.

Direct Tele Method

The first of these methods is a completely direct one. It involves reception of television program material, either by coaxial cable or radio transmission, and the optical projection of the received picture from the cathode ray tube of the receiver.

The tube in question, for theatre purposes, produces an intensely brilliant picture which, in turn, is projected by elaborately corrected and extremely efficient

reflective or refractive optical systems, or by some appropriate combination of these.

The television projection equipment, using this method, is a separate and distinct assembly. It includes the receiver, the connections to the coaxial cable or a radio receiving antenna, the appropriate circuit controls, the projection tube, the special power supply equipment, the optical system, a projection screen and a loudspeaker system, which last two elements may be identical with those used for motion picture operation, or may be separate therefrom but placed at an adjacent location.

Such equipment can be placed in a considerably enlarged projection room, next to the film projectors, or alternately, a space may be cleared in the orchestra or balcony and the equipment there located. A rather novel arrangement has occasionally been suggested, namely, placing the television equipment back of the screen on the stage of the theatre and projecting the picture through translucent screen, the audience being located on the side of the screen opposite to that of the television equipment.

It would be ideal, of course, if the television equipment could be placed in the projection room, or in an enlargement of this room. This avoids the use of valuable space in the balcony or orchestra and minimizes certain operating problems.

'Indirect' Film Method

A second method for theatre television leans more heavily on the use of film. It might be termed an "indirect" method. According to this system, the received signals, whether from coaxial cable or radio circuits, are made visible on a cathode ray tube of high quality and of normal dimensions and brightness. The received picture is synchronously photographed on an appropriate variety of film, which is then developed by highly specialized means, and at top speed.

Such film may emerge from the developing equipment in a condition suitable for projection in less than one minute after the material is received, and perhaps in a small fraction of a minute. To all intents and purposes, it is claimed by the advocates of this method that it amounts to "instantaneous" television reception.

The processed film is then run through the conventional theatre projector, fitted with some minor mechanical and electrical modifications, and the picture and sound are reproduced on the stage of the theatre in conventional motion picture fashion. Yet the audience is, in fact, receiving a television program, with but slight delay.

When this method is used, it is clear
(Continued on page 24)

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

WE WISH to extend our appreciation for the many beautiful Holiday cards we received from our many friends in all parts of the world. It would be physically impossible for us to personally acknowledge each card, and we take this means to thank our readers for their good wishes.

- The members of San Francisco Local 162 are extremely proud of the honor conferred upon two of their officials by Governor Earl Warren of California. Governor Warren has named Floyd Billingsley, 3rd I. A. vice-president and business manager for Local 162, a Commissioner member of the San Francisco World Trade Center Authority. The Governor also appointed Anthony L. Noreiga, president of the Local, as Commissioner of the State Correctional Industries Commission.

- We were sorry to learn of the death of Mrs. Ernest (Frenchy) Biencourt, wife of the business agent of San Antonio Local

76. Frenchy and May were familiar figures at I. A. Conventions and enjoyed the friendship of many members of the Alliance from all parts of the country. We sympathize deeply with Frenchy.

- According to a report issued by the Department of Commerce, net royalty payments to American film companies for the showing of American motion pictures in foreign countries in 1946 totalled \$138,000,000. The report estimated that the total receipts for 1947 would reach approximately the same figure.

- Joe Cifre, popular theatre supply dealer of Boston and member of Local 182, was elected Chief Barker of Variety Tent No. 23.

- Evidently the item in these columns last month telling about the efforts of Charlie Dentelbeck, chief projectionist for Canadian Famous Players, to obtain financial assistance for one of his men

who was stricken with a serious illness, and Famous Players' generous response to his appeal, prompted Abe Zumar, secretary of Local 257, Ottawa, to write of another instance in which this theatre circuit figured.

According to Zumar, William H. York, member of Local 257 and a veteran of World War I, had been employed by Famous Players for almost 25 years when he was taken ill and had to give up his job as projectionist at the Regent Theatre. When the circuit officials heard of his plight, they retained York on the payroll for the entire year of his illness until the time of his death. Of course, with a humanitarian like John Fitzgibbons as its president, we would expect Famous Players to do no less.

- Tom Canavan, St. Louis district manager for Altec, and brother of Wm. F., former president of the I. A., was installed as "dough guy" for Variety Tent No. 14.

- Re-elected to office for 23 consecutive years is the record piled up by Abe Zumar, secretary, and Bill Hartnett, business manager of Local 257, Ottawa, Canada. Evidently the Zumar-Hartnett team is a hard combination to beat.

- E. P. Lehnhoff, secretary of Local 548, Paris, Texas, believes in keeping his men on their toes where projection matters are concerned. He personally communicated with all manufacturers of projection room equipment for catalogues, instruction booklets, etc., and then passed them on to his members so that they might become better acquainted with their equipment and its maintenance. We think Lehnhoff has something here and it might be well for other union officials to follow suit.

- We think it was pretty smart of Louie Wutke, Los Angeles supply dealer and member of Local 150, to demonstrate the new DeVry projector head (12000 series) at a recent meeting of the Local. It was a swell opportunity for Wutke (and he took full advantage of it) to explain the whys and wherefores of the mechanism, and the members present were extremely interested in the demonstration.

We have long advocated that manufac-

UNION OFFICIALS AND PUBLIX THEATRES REPRESENTATIVE REACH AGREEMENT

This photograph was taken in San Antonio, Texas, April 1928, shortly after the conclusion of a successful conference between I. A. officials and a representative of Publix Theatres. Top row, left to right: J. L. McElyea, Wm. B. Keeler, and Roy Cogdill, president, business agent, and secretary, respectively, of San Antonio Local 407. Bottom row, left to right: C. E. (Red) Rupard, I. A. representative and business agent, Dallos Local 249; Harry Sherman, Publix Theatres representative, and Wm. (Fred) P. Raoul, I. A. representative.



turers of projection equipment hold frequent demonstrations of their products at projectionist gatherings—whether at Local Union meetings or at specially arranged affairs. A practical demonstration before a group of projectionists will more than compensate the manufacturer for the expense incurred, and we believe it will net him a far greater return than, say, 1000 letters and brochures sent to theatre owners. This is an angle too many equipment manufacturers overlook.

• The following note recently received from Wm. (Fred) P. Raoul, general secretary-treasurer of the I. A., sent us scurrying through our files for a photograph taken in San Antonio, Texas, about 20 years ago and which is reproduced elsewhere in this department:

Dear Harry:

Attached is a newspaper clipping which was given to me during a recent visit to San Antonio. Yes, we look a lot different now!

Yes, Fred, we may not set the feminine hearts aflutter today, but—well, modesty forbids our bragging.

• The election last month of officers for New York Local 306 was not without its dramatic moments. One was when Herman Gelber, president of the Local, announced the deaths that day of members Frank Hoffman and Ed Eichhorn. The entire assemblage of over 1500 people rose and stood in silent prayer for one minute.

There was drama too in the hotly contested election results. Ernie Lang nosed out Frank Inciardi for the office of recording-secretary by only two votes. The race for Brooklyn business agent remained in doubt until the last machine was tabulated, with Harry Garfman running a close second to the winner, Ben Scher.

During the campaign rumors were afloat that I. A. President Walsh was

George J. Schaffer, business manager of Los Angeles Local 150, and Father Hubbard, the famous Glacier Priest, pose with a copy of *International Projectionist*. Father Hubbard and Schaffer have been friends for many years, the priest having been one of George's instructors when he attended Loyola University.



Company Union Fraud

By SAMUEL GOMPERS

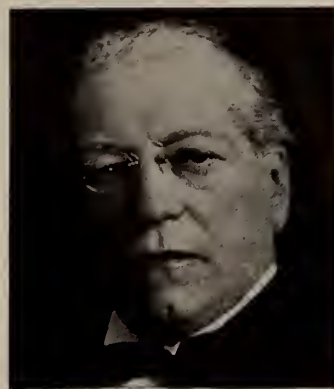
President, A. F. of L., 1882-1924

... There are certain simple facts in connection with labor organizations which workers ought to know for their own protection. ... Labor Organizations can be effective in behalf of the workers only when they are under the complete control of the workers. Inasmuch as service to the workers results in general social gain, labor organizations in reality serve society.

Labor organizations, however, must be answerable to the workers and the moment they cease to be answerable to the workers their effectiveness is diminished. ... Wise employers understand that by cooperating with labor organizations the best results can be achieved. Such employers understand that through cooperation with labor organizations it is possible to have continuous friendly relations, continuous operation of industry and a continually improving grade and rate of productivity.

Many employers are not sufficiently wise to understand those things and still believe that it is to their interests to try either to crush or to suborn organizations of the workers.

The company union is but one of several devices used by employers for the same purpose. Another device is the private detective introduced in labor organizations for the purpose of creating dissension, distrust and disintegration. In the company union there usually is a semblance of democracy, an imitation of control on the part of the workers. In every case, however, complete analysis shows that at some point or other the authority of the workers ceases and the authority of the employer becomes supreme. ... January, 1923.



lending his support to one of the presidential candidates. This rumor was denied by Walsh in a statement released to the trade press, and again when he obligated the officers at a regular meeting.

• Al Johnstone, I. A. representative, and Emile Beaud, business agent for New Orleans Local 293, attended a victory dinner in Shreveport last month in celebration of Local 222's (Shreveport) re-election of officers Eaton, Parker and Gwin—president, vice-president, and secretary, respectively.

• Hollywood Local 165 seems to be well represented in Masonic circles. Two of its projectionist members were recently installed as Masters of their Lodges. Reginald Bunce made the grade in Lankershim Lodge and Dewey Overton in Ionic Lodge No. 540. The Local also boasts of three Past Masters—Jim Bailey, Godfried Lohrli, and Harold Roddan.

• What happens to the payroll dollar is attested to in fulsome measure by recent cost-of-living figures released by the Bureau of Labor Statistics. Prices of all foods advanced 0.5% between October 15 and November 15, 1947. The retail food price index rose to 202.7% of the 1935-39 average in mid-November. This level was 8% above a year ago and 39% above June, 1946.

A preliminary check indicated that prices continued to climb to a new record high between mid-November and mid-December, 1947.

25 Years Ago—January 1923

• The IA Bulletin issued a warning to all members not to lean too heavily upon their membership cards for their livelihood. Members were cautioned to render proper degree of service and to perform their duties as good union men. ... The existence of internal strife and personal animosities in Local Unions was deplored, and members were urged not to place charges against each other merely because of personal disputes. ... Frank Lemaster, General Secretary-Treasurer, confined to his home with a severe attack of the gripe. ... Governor Smith of New York advocated the repeal of the moving picture censorship law. ... Judge Elbert H. Gary rejected the 8-hour day for fear it would "wreck the steel industry". ... Bill Canavan represented the I. A. at the inauguration of Oklahoma's new governor, Brother Jack Walton, member of Local 112, Oklahoma City. ... Lou Krouse left for Philadelphia to investigate the dual organization trying to gain a foothold in that city. ... Byron Arisinger, publisher of a labor weekly in Jackson, Mich., "The Square Deal," returned from a visit to Russia thoroughly disillusioned by what he found there. He toured different parts of the country and visited a number of the larger cities, finding nothing but misery. ... Labor organizations endorsed the newly organized Federation Trust Company of New York. ... John E. Edgarton, president of NAM

(Continued on page 30)

PROJECTION EQUIPMENT, TECHNIQUE IN '47

(Continued from page 16)

increase in the cost of living against the wage rise over the past 15 years. It was shown that since 1932 the cost of living had risen 63% as contrasted with a wage rise of only 7.3%.

The determination of American exporters of projection equipment to not only hold but to expand their foreign markets was reflected in the action of Westrex Corp. in assembling \$75,000 worth of special test equipment which was routed through foreign sales offices under the supervision of the company's assistant chief engineer.

RCA produced and circulated through the field a special 35-mm test reel for sound system checking. This reel reflected much improvement over the old standard SMPE test film.

Featuring a crossover point at 800 cy-



At the Washington end of the first long-distance television conversation.

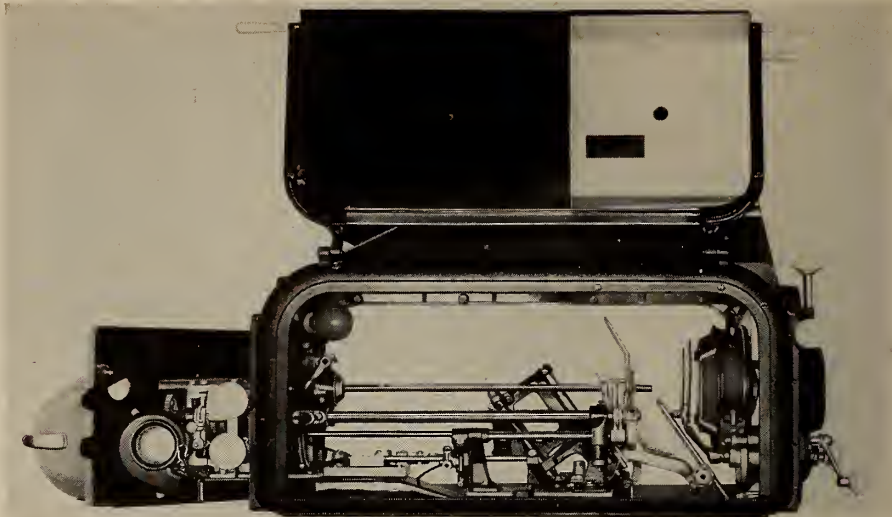
cles, instead of the heretofore conventional point of 500 cycles, the new "800" Voice of the Theatre speaker was produced by Altec for theatres having up to 1000 seats.

The old Superior 35-mm professional projector was completely re-designed and improved by Burgi Contner of Blue Seal Cine Devices. Coupled with the very popular Blue Seal sound system, the projector enabled this company to supply complete theatre projection facilities.

SMPE Screen Lighting Survey

Representing the most ambitious and comprehensive effort by the SMPE to assemble data bearing on actual practices in the theatre field was the program launched by the Screen Brightness Committee representatives of which checked theatre screens in theatres of various sizes in more than 25 cities, large and small. Readings were taken at 14 points on the screen surface, the results of which were correlated with data relating to the physical aspects and viewing conditions prevailing in the auditorium.

Designed for wide utility in the range



Interior view of Peerless Hy-Candescent arc lamp, viewed from operating side, showing burner element and, at rear, operating mechanism.

of 40-65 amperes, the first post-war Ashcraft carbon-arc lamp was marketed. Designated the C-70, this lamp featured

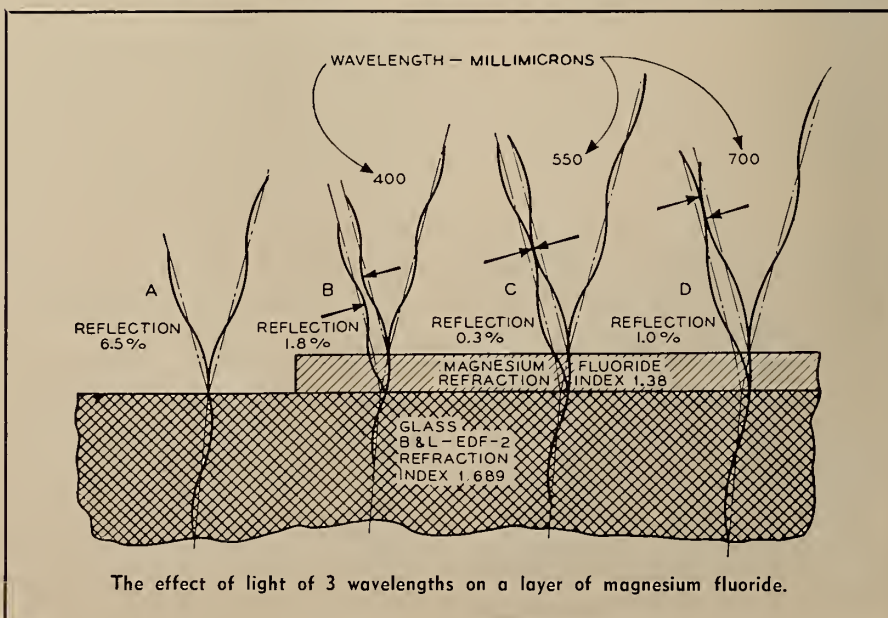
form of a simple steel loop mounted on the positive carbon holder replaced the conventional magnet positioned behind the mirror.

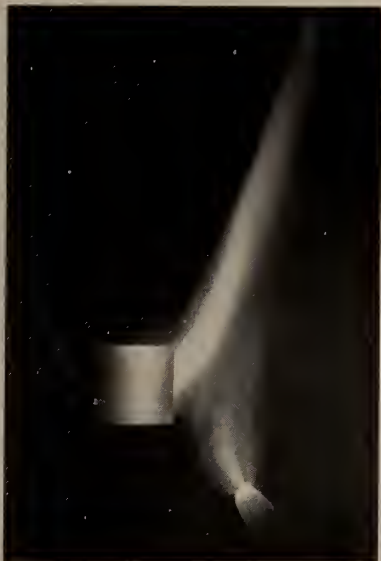
Projection standards in foreign countries, particularly in Scandinavia, were shown to be much higher than was commonly supposed, as evidenced by a series of illustrated articles in IP. The water-cooling of carbon arcs, even in the 70-100 ampere range, was disclosed to be quite common. Another surprise was the tight union organization of theatrical workers.

The joint TESMA-TEDPA trade exhibition and conference held in Washington, D. C., marked the finest exposition of its kind ever held in the theatre equipment field.

Challenging the carbon arc for general lighting purposes was a new cadmium-mercury lamp developed by Westinghouse. Fine results in terms of high light level and acceptable spectral characteristics were reported for this 1000-watt

unit construction and the positioning of all working parts, including the complete burner element, outside the housing proper. A novel arc stabilizer in the





The inclined trim high-intensity carbon arc (13.6-mm positive carbon at 150 amperes with the negative directed upward at an angle of 53 degrees from the horizontal).

lamp which is 14 inches long and 3½ inches in diameter.

Outdoor photography, particularly in the sports field, benefited mightily by the new Bausch & Lomb lens which, 34 inches long and weighing 32 pounds, afforded good detail at distances up to 400 feet. Operated at $f:5.6$, this lens has five separate elements.

RCA's Large-Screen Tele

Especially noteworthy amid the welter of television developments was the demonstration by RCA of its new large-screen tele system. While eminently acceptable in terms of size—48 square feet—the image produced by this system left much to be desired in terms of over-all lighting and detail.

New equipment continued to be made available as the raw material market eased a bit: Western Electric offered a new line of theatre speakers comprising eight different systems for houses of various sizes and differing physical charac-

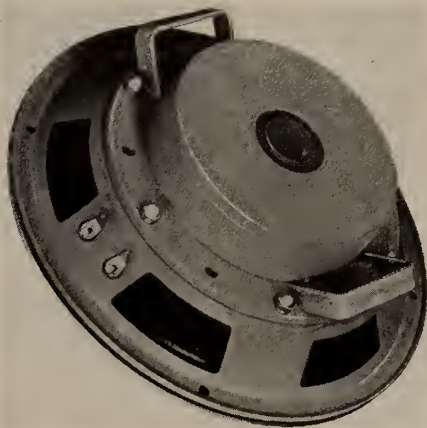
teristics. Kollmorgen's new $f:1.9$ coated projection lens became available in increasing quantity and were immediately snapped up by an acutely light-conscious theatre field. That ever versatile element, selenium, which has been assigned to a multiplicity of tasks in the past, including sound reproduction, was applied to a new six-phase rectifier which will be distributed through J. E. Robin, Inc.

Altec Service Corp. observed its Tenth Anniversary and used the occasion to re-dedicate itself to those basic principles of the best possible service at the lowest possible prices anytime, anywhere.

Projection arc amperages really began to soar with the introduction of the new Hy-Candescent lamp by J. E. McAuley Co. This unit, in the 180-200 ampere classification, features a special heat filter and water-cooled positive carbon contacts.

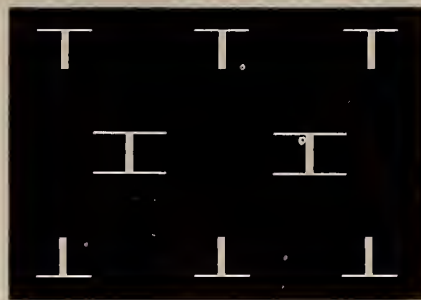
Sensational Soviet Stereo

Our friends in the Soviet Union staged a really sensational showing of three-dimensional films which, according to trained, unbiased observers, were the real



Used throughout the new W.E. speaker line, the 754-A direct radiator provides high power capacity and efficiency with a minimum of resonant 'boom'.

McCoy. Two separate films are used in the camera, the respective images being



TRAVEL-GHOST TARGET



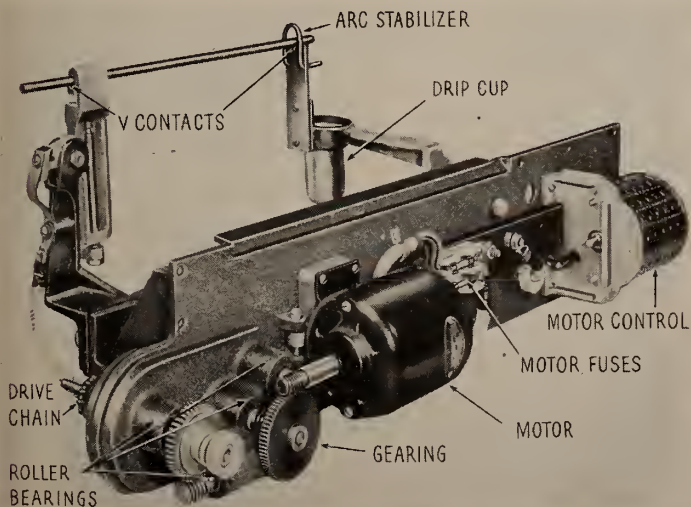
JUMP AND WEAVE TARGET

displaced anywhere from 65 to 750 mm apart. These images are projected simultaneously, but whether from a single or two separate films could not be determined from the sparse reports filtering through to America.

The screen used consists of hundreds of small conical lenses, 4 to 5 microns thick, mounted on plate glass. The necessity for maintaining more or less rigid sight lines is suggested by the report's reference to "200 specially-positioned

(Continued on page 33)

Harry Strong president of Strong Electric Corp., receiving name plate for 25,000th Strong rectifier from Charles Tuttle, plant superintendent. Strong organization is currently observing its 25th year in the manufacture of specialized projection equipment.



Complete mechanical assembly of the Ashcraft C-70 lamp (covers removed) which is wholly outside the housing. Also shown are burner element, including arc stabilizer.

THEATRE TELE PROSPECTS

(Continued from page 19)

that part, at least, of the television equipment will to advantage be located in the projection room and close to the film projectors. There would be little purpose in locating such equipment at a different point.

Rapid Development Seen

The increase in interest in theatre television during recent months has been striking and indicates clearly that this field is on the verge of a rapid technical and commercial development.

The Society of Motion Picture Engineers has contributed substantially to the development of theatre television, through its own Television Committee. This committee, over a period of years, has systematically studied what would be required to provide theatre television service to a single theatre network in one city; what would be needed to provide such service to several theatre networks in a single city; and even what would be required to permit nationwide television service to a number of groups of theatres located in many cities.

The Society has presented its viewpoint to the Federal Communications Commission on several occasions, and has won

respect and approval of important groups within and outside of the motion picture industry.

More recently a special committee inside the motion picture industry studied theatre television and reached the conclusion that it was not yet ready for large-scale commercial exploitation. The validity of this conclusion depends upon one's interpretation of the term "ready". It is clear that a considerable amount of cooperative effort between the motion picture industry and the television manufacturers will be needed before the most desirable and economical types of equipment are available in quantity for commercial theatre use. *But the major elements needed for theatre television are already available.*

RCA-Warner Joint Action

In pursuance of this thought, arrangements were recently concluded between Warner Brothers and RCA. These organizations will cooperatively study and develop theatre television methods. Doubtless other major groups in the motion picture industry will contribute their quotas of knowledge, both technical and commercial, to the development of theatre television.

In England, that energetic impresario, J. Arthur Rank, has announced that a

group of his theatres will be equipped for television presentations, and that the equipment itself is designed and on order.

Any description of the cooperative effort in the theatre television field would be less than complete if it failed to mention the constructive activities of the film manufacturers, and notably of Eastman Kodak Co. This organization has produced types of film, special processing equipment, and allied information and apparatus which have contributed substantially to the systematic development of theatre television.

Theatre Programming Problem

The question which always arises in connection with theatre television is the nature of the program. Admittedly it is not easy to fit television events into a normal theatre schedule. Feature films, shorts, and newsreels are presented according to a regular schedule at most

Order Your Copy of

Projectionists'

\$3.00

**SERVICE
MANUAL**



Process backgrounds with B&L Super Cinephor Lenses

FILMING technique often calls for projected process backgrounds instead of location shots. To obtain maximum edge-to-edge brilliance, contrast and sharpness in projecting backgrounds, many leading Hollywood photographers depend on Bausch & Lomb Projection Lenses. Only the finest quality lens could meet this tough test satisfactorily, because critically precise camera lenses pick up flaws in the projected image.

For sharp, brilliant pictures on your screen that pay off at your boxoffice, take a tip from Hollywood—use Bausch & Lomb Projection Lenses. Bausch & Lomb Optical Co., 616-M St. Paul Street, Rochester 2, N. Y.



BAUSCH & LOMB

OPTICAL COMPANY  ROCHESTER 2, N. Y.

theatres. Naturally, the intrusion, so to speak, of television material, must be skillfully planned and the normal theatre program must be flexibly constructed, to permit the television presentation at the time of occurrence, of events of even transcendental public interest.

If these events are recorded on film in the theatre they may again be presented in successive performances.

As to the nature of the television programs, the enthusiastic reception of sports events in public places has shown clearly that there would be a large and responsive audience for such events.

Tips for Theatre Owners

The best advice that can be given to the present or prospective theatre owner is that he shall lay out his projection room facilities with at least 100% overage space and a correspondingly increased power supply, and the like. In addition, he should be sure that his architect designs any new theatres so that there will be plenty of structural strength to support the enlarged and more elaborate motion picture and television projection rooms of the future.

Further, considering the complexity of the theatre television field, and of television itself, the theatre owner will be well-advised to keep himself thoroughly up-to-date on the current literature on the subject.

Theatre television offers new and attractive vistas of accomplishment to those who have showmanship, imagination, and the pioneering spirit. And it is interesting to reflect that the same engineering and presentation techniques which will offer television broadcasting to the home audience will also make available highly attractive theatre television to the theatre-going public and the motion picture industry.

Hi-Speed Refracting Lens

The fastest known, high-speed, all-refracting photographic lens has recently been developed by the U. S. Army Signal Corps at their Engineering Laboratories at Fort Monmouth, N. J., it was learned recently. Used in making photos under extremely poor light conditions, it is particularly suitable for making motion pictures of X-ray fluorescent screens and of cathode ray tube traces.

The relative aperture system of the new lens can be made as large as $f:0.6$, which approaches the theoretical maximum, $f:0.5$. The lens, developed by Edward K. Kaprelian, chief of the photographic branch at the Squier Signal Laboratory, has six elements made of at least four different kinds of glass. Neglecting reflection and absorption losses, the image produced is about two-thirds as bright as the object.

The design of the Army lens is based on modifications of the Petzval portrait

lens, by adding air-spaced correcting elements which permit an increase of aperture without sacrifice of correction. The lens has been made in focal lengths of 54-mm and 33-mm, the latter for use with 16-mm motion picture cameras. The lens can also be used in projectors.

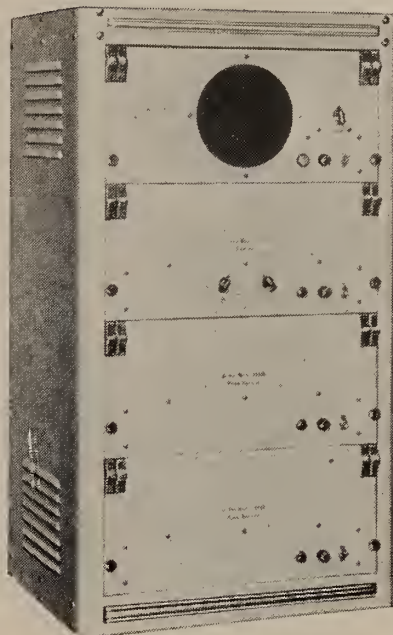
The modification of the Petzval system is made by adding two additional components, one negative and one positive in power. The indices of refraction of the glass and the relative powers and shapes of the additional components are chosen so that extreme apertures are possible with accurate correction for chromatic and spherical aberration, as well as for coma, astigmatism, curvature

of field and distortion. Such aberration as cannot be balanced out between the additional components are corrected by residuals in the original Petzval pairs.

Plan Airport Film Theatre Chain

Airlines Terminal Theatres, Inc., formed to install and operate short-subject film theatres at major airports, has been incorporated in Michigan. Supplementing the film program will be a direct press teletype news service. Innovation will be use of Visu-Matic system which, utilizing a small screen alongside the regular theatre screen, will keep audience informed of plane arrivals and departures and personal messages received at the airport information center.

Increase your "take" in '48 with NEW DeVRY "Hi-Fidelity" Sound Systems IMMEDIATE DELIVERY! NO INCREASE IN PRICE!



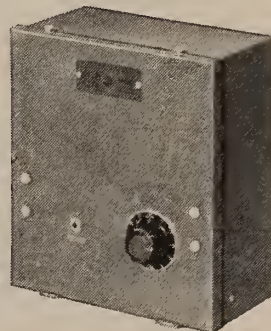
New DeVRY amplifiers incorporate all latest "proven" electronic developments essential for true-to-life, humless sound reproduction. They are wired and mounted to cabinets so that any unit can be easily, quickly removed for servicing or replacement in the matter of seconds.

DEVRY DUAL CHANNEL 40 WATT AMPLIFIERS

Utilizes two 20 watt power amplifiers, supplying 20 watts independently or 40 watts in conjunction. Separate high and low frequency compensation controls give corrections for all types of operating conditions. Frequency range from 40 to 10,000 cycles. Built to give year after year efficient trouble-free operation.

80 Watt Amplifiers Also Available PRE-AMPLIFIERS

With each DeVRY 40 or 80 watt amplifier is furnished upon request two matched Pre-Amplifiers. A combination of the above with a 9-volt DeVRY Exciter Supply Rectifier will replace any type or make sound system used in theaters today.



Now at your DeVRY Theater Supply Dealer



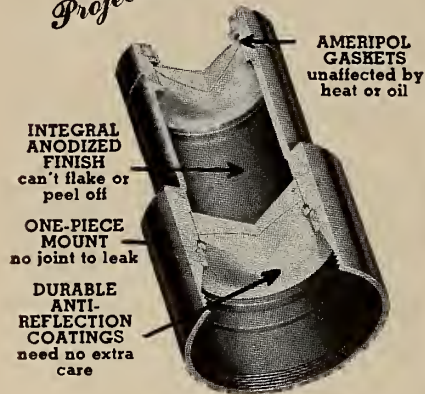
Enjoy "Nature Real" Sound with a DeVRY Exciter Lamp Rectifier

With increased speaker system efficiency, it is vital that hum-free direct current be supplied to the Exciter Lamp. Unit supplies hum-free direct current to any type Exciter Lamp where wattage does not exceed 45 watts.

In 250-seat to 6,000-seat theaters—in "drive-ins" with up to 1,000-car capacity—DeVRY's "12000 Series" installations are today helping achieve new highs in audience satisfaction. You, too, will want to know more about this sensational new equipment that gives you so much more of what you want to help achieve the "perfect show"—and for such a moderate price. DeVRY Corporation, 1111 Armitage Ave., Chicago 14, Illinois. In Canada contact Arrow Films, Ltd., 1115 Bay St., Toronto 5, Ontario.

**For the Perfect Show Your Best
Indoors or Out Buy is a DeVRY**

LOOK inside a SNAPLITE... See Why it's The Projection Lens of Quality



All Aluminum Construction

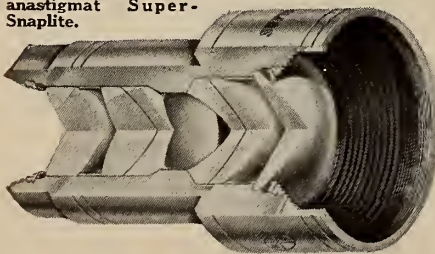
Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

...

TROUBLE-FREE performance is assured by the hermetically sealed construction of Snaplite and Super-Snaplite lenses. They never need to be taken apart for cleaning—no dust or oil can enter! And their anodized finishes can't flake off!

For brighter . . . sharper . . . clearer pictures, use f/2.0 Snaplites or f/1.9 Super-Snaplites in your projectors! Full details of all Snaplite lenses are given in Bulletin 204, available from your local supply dealer.

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Optical CORPORATION

LEAD-SULFIDE CELLS

(Continued from page 10)

ating in conjunction with this lamp whose filament is maintained at around 1500 degrees centigrade delivers a signal voltage equal to or higher than that from conventional systems with an exciter lamp filament temperature of around 2700 degrees centigrade. No 120-cycle hum is observed from the indirectly heated lamp. Conventional radio-frequency or direct-current heating of exciter lamps may thus be eliminated by using the lead-sulfide cell as detector and the indirectly heated lamp.

DISCUSSION

MR. LEWIS: As I understand it, this cell places before the film distributors or printers the question of whether to put out dye tracks or silver-salt sound tracks on their films. Is that correct?

DR. R. J. CASHMAN: I don't believe I am in a position to give a satisfactory answer to that question. The dye sound track has not been tried with this cell. It is well known that the dye sound track has a high transmission, around 8/10 or 9/10 of a micron.

I have not found any data in the literature showing absorption or transmission characteristics in the region where this cell would come into its own. If there were an absorption band at 2 microns or 1½ microns, then the contrast might be great enough to make the cell work very well with a dye sound track.

Comparison with Standard Setup

DR. J. C. FRAYNE: How does the output versus the input compare with the standard setup?

DR. CASHMAN: The output or signal voltage developed by the cell is a function of the intensity of the impinging radiation. It is linear up to about 30 foot-candles. The relation from there on to higher intensities, like that of the sun, follows a square-root law, but up to about 30 foot candles the cell is quite linear.

There is another point in regard to background effects. No matter what the current is due to, the phototube increases its noise in proportion to the square root of the current through it. The current could be caused by background radiation. The lead-sulfide cell, on the other hand, decreases in noise with background. The signal drops somewhat with background, but the signal-to-noise ratio is reduced very little.

DR. E. W. KELLOGG: I didn't understand whether this is a thin film or not. You spoke of the area, but I didn't understand the thickness.

DR. CASHMAN: The thickness is such that the layer is about opaque.

DR. KELLOGG: Very thin?

DR. CASHMAN: Yes.

Cells Available; No Lamps

DR. KELLOGG: I believe you said something about the name of the company that could supply it.

DR. CASHMAN: Some of these types are made by Electro-Voice Corp., Chicago. Several other concerns are setting up manufacturing facilities to make the cell.

MR. MORELOCK: Is the exciter lamp also commercially available?

DR. CASHMAN: It is still being experimented with and is not yet available.

MR. GREEN: You mentioned the signal-to-noise ratio. Do you mean that in running a variable-area track, which is approximately half clear and half opaque, the lead-sulfide cell will be quieter?

DR. CASHMAN: Yes, because the noise does not go up with the background—it goes down.

MR. W. S. MARTIN: What about the life of these cells in comparison with the old cells?

DR. CASHMAN: It is hard to say. We haven't had them long enough. Some have been in use since 1944 and are still just as good as when they were made.

MR. MARTIN: Can the sensitivity of this cell be controlled very accurately?

DR. CASHMAN: You mean in manufacture?

MR. MARTIN: Yes.

DR. CASHMAN: The cell characteristics



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can be controlled quite accurately.

MR. MARTIN: Have you done any experimenting with inserting a reflector to reflect the light after it passes through the film into the photocell instead of going direct from the exciter lamp after it passes through the film?

DR. CASHMAN: I haven't, but I believe Mr. Van Niman has.

MR. R. T. VAN NIMAN: We have used both lenses and mirrors.

References to Prior Art

MR. E. I. SPONABLE: I spent about ten years on photoactive materials that change resistance on exposure to light. So far as I know, we at Case Research Laboratory discovered the photoactivity of lead sulfide, antimony sulfide, and thallous sulfide. Back in 1918 I remember that we were able to detect a man smoking a cigar a mile away. We thought that quite an achievement at the time. We also talked over a light beam a distance of some eight or ten miles. I am glad to hear that this interesting material has been rediscovered.

DR. CASHMAN: If I recall correctly, in your experiments you used 60-inch mirrors or something like that.

The Case Research Laboratory deserves the highest praise for its exploratory work in this field. The laboratory is best known for its development of photosensitive thallous sulfide. The cells made with their material were not stable, however. This defect has been overcome in the modern thallous-sulfide cells.

The Case laboratory also observed photosensitivity in natural lead sulfide (Galena) but this observation had been reported several times previously by other investigators, for instance, Mercadier, U. S. Patent 420,884 (1890). The present lead-sulfide cell contains an activated synthetic preparation of lead sulfide.

Footcandle Unit of Measurement

Intensity of illumination on a surface is measured in terms of the footcandle. Imagine a light source and a surface perpendicular to a line drawn from it to the light source. At a distance of one foot from a light source of one candlepower the level of illumination is one footcandle. At 10 feet from a source of 100 candlepower the illumination is one footcandle.

Intensity of illumination generally varies inversely as the square of the distance from the source of light. This fact is commonly ignored by users of light.

FM Solves NYC Police Radio Problem

With the recent installation of RCA mobile FM transmitters and receivers in a fleet of 150 patrol and emergency cars assigned to the Borough of Brooklyn, the Police Department of the City of New York advanced one more step toward the completion of the largest two-way police communications in the world. Similar equipment is already in operation in the boroughs of Queens and Richmond and work is already under way in the boroughs of Manhattan and Bronx.

Installed by RCA's Engineering Products Department, the system includes a 250-watt

station transmitter at the Police Department's Brooklyn headquarters, capable of communicating with cars in every part of the 71 square-mile borough.

Using the call letters WRQP, the headquarters transmitter operates on a frequency of 39.58 megacycles, while the mobile transmitters operate on two different frequencies: 37.22 mc for the eastern portion of Brooklyn and 29.38mc for the western part of the borough. The two frequencies permit cars in either part of the borough to call the dispatchers' office simultaneously and enable cars transferred from one section to another to keep in continuous, direct contact with headquarters.

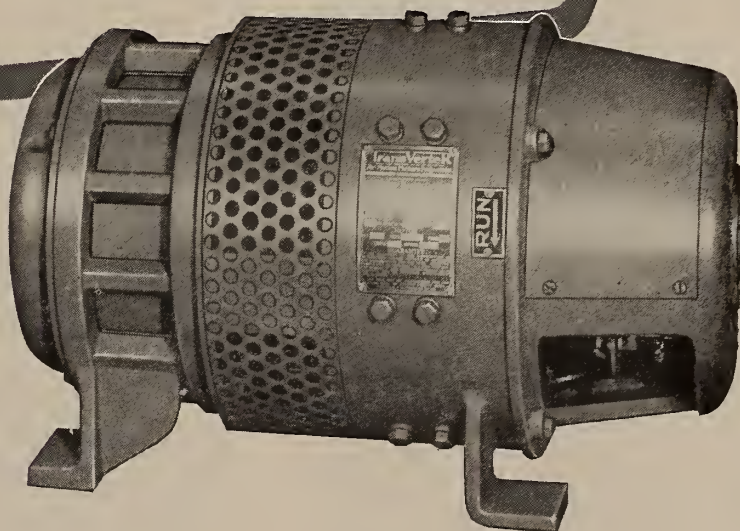
The new FM installation replaces the former one-way AM system previously em-

ployed. Due to interference and static caused by tall buildings and industrial use of high-voltage electricity, it was decided to switch from the amplitude to the frequency type of modulation. Inspector Francis A. Burns, acting Superintendent of the Police Department's Telegraph Bureau has stated that all five boroughs of the city would be covered by this new FM network within a few months.

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AMERICAN TRADE UNIONS

(Continued from page 10)

cialists, also feared the division which might develop if German workmen were to be organized into too many craft unions. They might become too deeply interested in building up their craft strength and not sufficiently active in organizing the weaker groups and forging labor as a whole into a phalanx which would be irresistible industrially. They advocated labor organizations which would include all workmen employed in an industry, regardless of their varying degrees of training, capacity and skills.

It was under these circumstances that the theory and practice of industrial unionism (vertical unions) was developed and applied.

Finding that they could not prevent the growth of trade unionism, the intellectual leaders, forced to accommodate themselves, made industrial unionism a definite part of Socialist propaganda and policy.

When socialism had made sufficient progress in the United States to justify the organizing of the National Socialist Party, one of its first actions was to make industrial unionism one of the prominent planks of its propaganda platform.

From the beginning of its existence in America many Socialist leaders attacked the American Federation of Labor with the same venomous spirit which had led the intellectual leaders in Germany to attack a fellow Socialist, Alexander Schlichte, and his associates, who were determined that workmen must have an industrial as well as political organization.

The Knights of Labor

While this Socialist conception of industrial unionism was being developed in Germany and imported into the United States, a labor movement was developing in our country which led to the first open conflict between groups of organized workmen, a contest from which the American Federation of Labor emerged the victor.

For some years the Knights of Labor had been organizing secretly, but continu-

ally gaining in strength and purpose. The Knights' form of organization was based upon the industrial union program. All employees of an employer were to be members of a "mixed assembly". When the new movement emerged from its highly secret character it seemed to many workers to be the answer to their industrial problems.

The Knights of Labor became a national organization with a vigorous press and many able and convincing speakers. It grew in power and prestige so rapidly that the national and international unions of craftsmen that had weathered the economic storms of 1873 believed it might prove to be a movement with which they might unite to reestablish the federation of trade unions first organized in the National Labor Union.

Conferences were held with officers of the Knights. The question of each union retaining its autonomy if it affiliated was discussed and it was agreed that autonomy was to be retained. Soon practically



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all of the national and international unions had become members.

With this great increase in numbers the Knights became more active in pressing their partisan political program. What was more disquieting to the organizations which had affiliated was the constant propaganda of the Knights against craft unions, and the insistence that all workmen must be organized into "mixed assemblies". In fact, the leaders of the Knights made greater efforts to spread their program in the ranks of the established national and international unions than in organizing the unorganized.

Knight's Political Program

Two facts became evident. If the program of the Knights succeeded, organized labor would again be led into the quagmire of partisan politics; also the national and international unions would be replaced by an industrial (vertical) form of organization. As many of these unions had been organized before the Civil War, had weathered that national-shaking conflict, had brought the first federation of labor into existence through the National Labor Union, and had withstood the collapse of that organization and the panic of 1873, they were not prepared, as experienced veterans, to surrender what they had found to be practical for the promises held out by the Knights of Labor.

There were bitter contests in the new official family and in the conventions of the organization between the supporters of the Knights' expanding policies and the leaders of the national and international unions. Finding that the Knights believed themselves strong enough to force their program upon the organizations which had affiliated, the leaders of the unions agreed upon drastic action.

They decided that their members, and not the Knights, were the only ones to decide upon the form of organization they desired. They refused to accept the dictum that a majority in a federation could vote out of existence organizations much older and more experienced.

The organizations which had affiliated severed their relations with the Knights. They agreed to organize a federation of their own in which each affiliated national or international union would have unquestioned autonomy over its internal affairs, including the form of organization it would adopt.

[To Be Continued]

Addendum : Listener Preference

LISTENER preferences, the topic of several interesting presentations in IP during the past year, is the theme of an arresting commentary by R. B. Nottingham, of the Brush Development Co., in a recent statement to *Communications*

magazine. Recognizing the widespread preference of auditors for "bassy" sound reproduction, this contributor gives his views as to the reason therefore. His comments, in part, follow:

It seems to me that one important factor has been omitted in the reasons given for preference for a restricted range—high-frequency sounds are more attention-arresting than those of lower frequency.

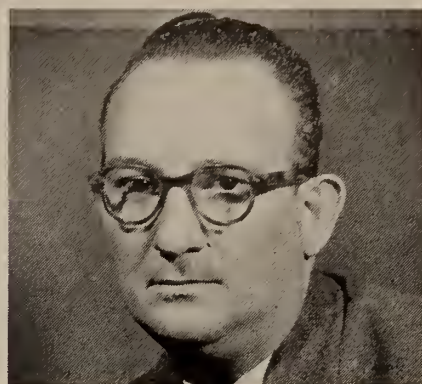
Prior to the advent of radio, listeners seldom heard music except when they made a considerable effort to do so, such as attending a concert. Under these circumstances, they attended to listen to the music, not to use it as a background for conversation or other activity.

'Highs' Attention-Compelling

With the advent of radio, music is now used chiefly as a background. People have developed an aversion to silence and often have the radio on from morning till night with only scattered periods of real listening. Under these circumstances, the presence of high frequencies is attention-compelling and therefore irritating, but if highs are cut heavily, a pleasant, unobtrusive rumble results which provides the required noise with minimum distraction.

I do not mean to imply in the foregoing that the other factors listed are not of importance. High-fidelity music is

quite probably an acquired taste which will gain acceptance when the public is given an opportunity to hear it more frequently.



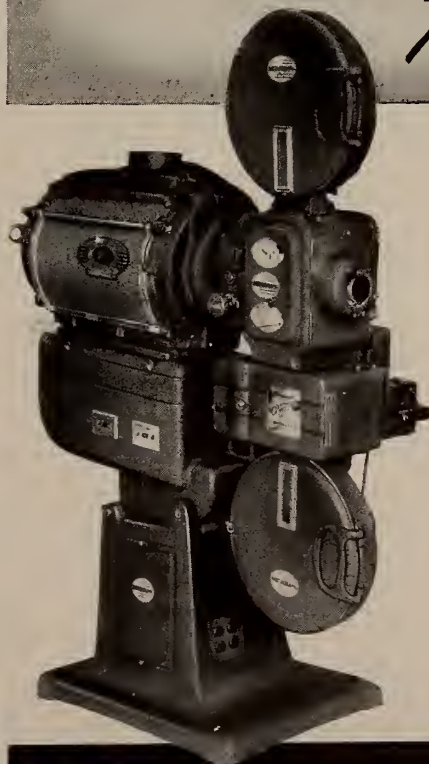
STEWART R. MARTIN—Treasurer and General Manager, Embassy Newsreel Theatres, New York City, and Newark, N. J.—says:

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IN THE SPOTLIGHT

(Continued from page 21)

denied Sam Gompers' claim that there is a "conspiracy to crush organized labor." Edgerton's logic in explaining the stand of NAM on the union shop was rather muddled. He professed to favor the anti-union shop although he did not oppose organized labor!

• During the past year we commented several times on law suits brought against Local Unions by men who had real or

fancied grievances. The plaintiff, in each case, worked in the jurisdiction of the sued Local either as an apprentice under a temporary working permit or as a member of a sister Local. He usually sued for the right to retain permanency on his job or else demanded full Union membership privileges.

Kansas City, Kans., Local 489 was recently sued by an apprentice member, Joe D. Gicante, who worked in the Local's jurisdiction for several years. He instituted action when the Local sought to eliminate the special ruling under which

he worked and attempted to replace him on the job. Judge Russell G. Hardy, of the Wyandotte County District Court, who heard the case, sustained the contention of the Local that Gicante failed to establish a case for himself. It was also brought out at the court trial that the plaintiff's application for membership in the Local was rejected several months previously by a majority vote of the members.

As we have pointed out so many times, court action against a Local Union may be instituted only *after all remedies within the I. A. have been exhausted*. A careful reading of the I. A. Constitution and By-Laws *before* rushing into court probably would have saved Gicante plenty of headaches plus his bankroll.

• Pride in his I. A. affiliation is indicated in the accompanying picture of D. W. Hubbard, member of Los Angeles Local 150 and projectionist at the Larkershin Theatre in Hollywood. Hubbard sent us two pictures of himself wearing



his working uniform on which is displayed the I. A. emblem, but unfortunately the one showing him facing the camera was such a poor print that it could not be used for reproduction, hence a back view.

Incidentally, Hubbard suggested that those interested in the emblem contact Paul Mahoney, assistant business agent for Local 150, for further information.

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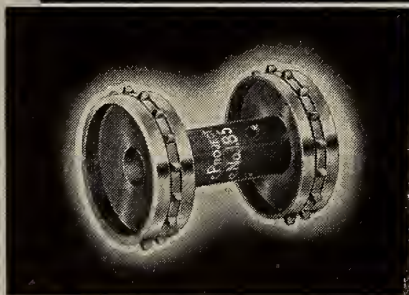
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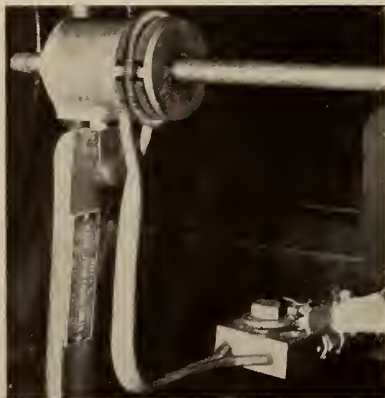


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Paramount Net Drops

Paramount Pictures' earnings for the quarter ending October 4, 1947 dropped \$4 million below the comparable 1946 quarter. Estimates put their net at \$8 million after all charges and taxes had been deducted.

On the same basis, Paramount's net for the three quarters ending October 4 are estimated at \$25½ million in comparison with almost \$34 million in the same 1946 period.

Third quarter earnings are equal to \$1.15 per share on outstanding common stock, compared with \$1.61 in 1946 and nine-month earnings are equal to \$3.63, \$1.78 lower than last year's figure.

HISTORICAL DEVELOPMENT OF SOUND FILM

(Continued from page 18)

with a musical synchronization was "Captain Swagger" with Rod La Rocque; and this was followed by several others in rapid succession. The Pathe organization also released a sound newsreel recorded by the Photophone process.

Jan. 1929: RCA closed a deal for the acquisition of the Victor Talking Machine Co.

Mar. 1929: RCA, Tobis, and Klangfilm announced a working agreement.

Dec. 31, 1929: RCA Photophone had equipped for sound about 1200 theatres in the United States, and about 600 abroad.

Dec. 1929: It was announced that RCA Photophone would shortly center all of its sound picture development work at Camden, N. J., combining the G. E. and Westinghouse groups who had previously operated independently.

Miscellaneous Sound Systems

May 22, 1926: Thomas A. Edison declared no field exists for talking pictures.

Nov. 1926: A device called the "Remaphone" was brought out. It consisted of a Victor "Electrola" with two turntables connected by a shaft to the two projection machines in the booth.

Feb. 1927: Synchrophone Corp. offered a new synchronization device for use in small theatres and provided music from disks.

Spring 1927: Vocafilm and Orchestraphone were made available for synchronizing pictures. The Orchestraphone was designed primarily for small theatres and initially tried in Chicago.

July 1927: Vocafilm gave a showing using its sound picture system at the Longacre Theatre, New York.

Dec. 1927: Orchestraphone, marketed by the National Theater Supply Co., was shown at the Tivoli Theatre, New York.

Bristolphone was demonstrated before the Franklin Institute.

Apr. 1928: Motion pictures were transmitted over telephone between Chicago and New York.

Aug. 1928: M. A. Schlesinger bought control of the de Forest Phonofilm Co. He had previously held an option to purchase the company; this option had expired in 1927. General Talking Pictures was formed as the new operating company.

Nov. 1928: Acoustic Products (Sonora) acquired manufacturing, distributing, and licensing rights to Bristolphone.

Dec. 1928: Cinetone, a sound device for home use, was offered by DeVry.

Jan. 1929: Pacent started installations approved by Warners.

Sept. 1929: Powers Cinephone was placed on the market.

Dec. 1929: At the end of this year,

there were 234 different types of theatre sound equipments in use; most of these, produced by the independents, were for sound-on-disk. The total number of theatres equipped for sound of all makes in the United States was 8741. Of these installations, ERPI and RCA had provided 4393.

As has been indicated in the introduction, these notes have treated certain developments very fully and have made only the briefest mention of some others. This is not to be construed as a judgment of relative importance *alone*; rather, it also has been decided on the basis of what has previously been written on the subject, and the author's more intimate knowledge of certain details.

For example, the material on the Case work has, for the most part, never before been made public; and even this could not be reviewed in great detail in an article of this kind. It is hoped, however, that enough has been told to give the reader a concise picture of what took place during this rather brief development period.

It has seemed appropriate to end this history in the early thirties, since at this time sound-on-film had completed the initial stages of its development, and had justified its existence as a commercial achievement of the first order.

[Ed. NOTE.—Following Mr. Sponable's paper a film was exhibited demonstrating

early sound-on-film, containing the following subjects]:

Subject	Pro- jection Speed	Date
T. W. Case, close-up	75	March 1924
Man with harmonica	75	March 1924
T. W. Case (tuxedo)	80	April 1924
Man playing harp	80	April 1924
Man and duck	85	May 12, 1925
T. W. Case, close-up	85	May 1925
Chinese boy playing ukulele	85	June 1926
Raquel Meller	90	November 1926
Harold Murray	90	November 1926
Sunrise (Scored silent)	90	June 1927

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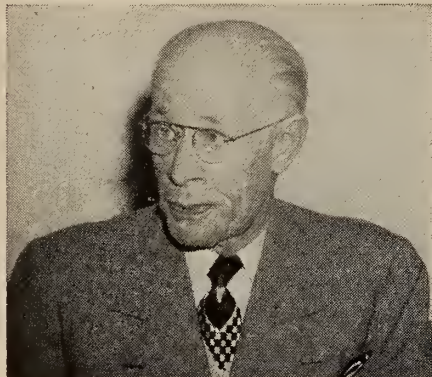
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LOCAL 173, TORONTO, CANADA

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LOCAL 182, BOSTON, MASS.

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PROJECTION EQUIPMENT, TECHNIQUE IN 1947

(Continued from page 23)

seats" and the necessity for avoiding any sharp lateral movement of the head during the showing.

The inventor, S. Ivanov, is now working on a screen having more than 1000 separate images of a "simple, inexpensive construction that can be mass-produced."

Allied Control Commission science investigators reported on a 1000-ampere searchlight carbon which, although sometimes unstable because of control difficulties, gave promise of developing into the most powerful light source the world has ever known. (Details in IP for March, 1947, p. 23.)

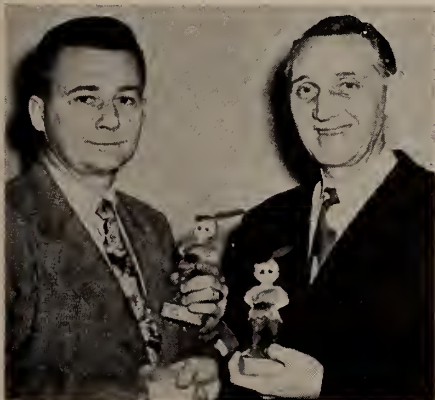
Motiograph reported that sales for its new "AA" projector, brought out in 1946, had far surpassed any previous model of this notable projection line. Especially encouraging was the fact that almost invariably improved sound equipment was installed along with the new projectors.

Projection Pioneers Pass

The equipment field sustained the loss through death of several prominent members: J. E. Robin, noted engineer and equipment dealer who contributed substantially to the formation of dealer groups; Larry Strong, head of Essannay Electric Mfg. Co., which made and sold, among other items, the Strong Zipper changeover; Izzy Perse, veteran New York City supply dealer; George Applegate, chief engineer for Westrex Corp., and Arthur Dickenson, head of the Film Conservation Bureau of the Motion Picture Association.

Being in the nature of a footnote to technological change, it was revealed that in 1946 approximately \$6,926,265 went to producers, writers and actresses working for RKO. Just 95 individuals drew a

Friendly Cine Competition



Bill DeVry, prexy of DeVry Corp., and Harry Monson, v-p and sales manager for Ampro Corp., congratulate each other on red-feathered "Oscars" won in Chicago Community Fund Drive. Former headed professional group; latter directed photographic section.

combined \$2,698,124 in salaries of \$20,000 or better, but not exceeding \$50,000. Another 34 were paid a bulk \$2,252,192 in wages of \$50,000 or more but not more than \$100,000 each. A dozen people drew better than \$100,000 for an aggregate of \$1,975,949.

This conveys a pretty clear picture, it was noted, of how the Hollywood boys and girls work at peon levels in the name of ART.

No, 1947 was not remarkable for any broad advances in terms of radically dif-

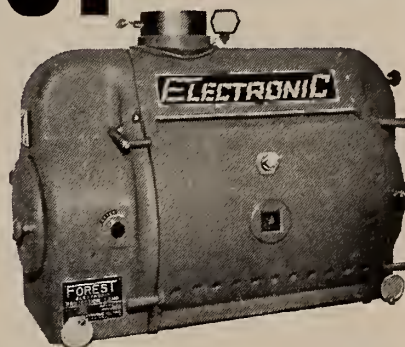
ferent equipments or techniques, but there is no lack of evidence that the plans formulated and the trends that unmistakably began to develop during that period will have a profound effect upon the projection process in the not too distant future.

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**NEW BRENKERTS, DeVRYs,
MOTIOGRAPHS ARE FACTORY
EQUIPPED WITH "ZIPPERS"**

Convincing proof of the equipment manufacturer's change-over preference, is the selection of Strong "Zipper" Changeovers as *standard factory equipment* on new "AA" MOTIOGRAPH, new postwar DeVRY, and the new BRENKERT theater projectors. Strong "Zipper" Changeovers are available in three models: Strong *Special* (for porthole installation), Strong *Zipper* for sight alone or sound alone, and Strong *Dual-Purpose Zipper* for both *sight and sound*. Essannay Electric Manufacturing Co., 1438 N. Clark, Chicago 10.



STRONG'S *Zipper* **CHANGEOVERS**
AN ESSANNAY ELECTRIC MANUFACTURING PRODUCT

H. Strong's 1947 Film Treatise Tops All Previous Efforts

Exhibitors throughout the world are now receiving "Your Album of World Cinemas," latest in a series of highly informative treatises on motion pictures written and published by Harry Strong, head of Strong Electric Corp., Toledo, Ohio, manufacturers of arc lamps, reflectors and rectifiers.

This volume presents in full-page illustrations representative film theatres in 27 foreign countries, with fronts, lobbies, auditoriums and projection rooms being treated additionally. Policies, prices, capacities, types of product shown and other interesting data anent these theatres is offered. The book proves conclusively that America is by no means alone in sponsoring fine theatres.

Printed in gray black on gray stock, with a wrap-around cover bearing a map of the world in marine motif printed in white ink on a darker gray stock, the book is a tribute to graphic arts craftsmanship. Other Strong books include Light, Then and Now, Reflections, Lamplight, The Theatreman's Wartime Guide, Fascinating Hands, Film Family Album, and Stages Through the Ages.

New DeVry 'Bantam' Unique in 16-mm Sound Movie Field

Incorporating projector mechanism, soundhead, amplifier, speaker and screen all in one compact case weighing less than 31 lbs., with a pickup or operating weight of only 25½ lbs., the new DeVry "Bantam" 16-mm sound movie projector is literally a theatre in a suitcase. This equipment sells for \$325 complete, despite the fact that, as Bill DeVry points out, photo equipment prices in general have risen more than 40%.

Technical features of this outfit include 750-1000 watt illumination, coated lenses, a highly efficient sound filtering system, positive flutter elimination; and an ingenious arrangement whereby spring-dampened sound filtering rollers

New DeVry "Bantam" 16-mm sound motion picture projector weighing under 31 pounds, with a pick-up or operating weight of only 25½ pounds. Speaker and front door removed.



acting in conjunction with a statically and dynamically balanced flywheel, assures absolutely constant speed of the film past the scanning point.

Of special interest is a newly-conceived automatic loop setter which makes possible the resetting of the lower loop without damage to the film when the loop is lost due to faulty film or to incorrect threading. A flip of a level automatically resets the correct loop.

Film capacity is 2000 feet. All controls are on one accessible panel. Film is quickly rewound by motor without changing reels. Other features include one-point lubrication, a positive tilting device, dependable drive-motor, side tension control at the aperture, cool operation by means of a ventilating system coupled with a motor-driven fan, and quiet operation on either a.c. or d.c.

The 6-inch Alnico 5 p. m. speaker is usable in any one of three ways: attached to projector in carrying position, open with speaker grille facing the audience, or at the screen by means of a 25-ft. cable which is furnished. Complete details available from DeVry Corp., 1111 Armistage Ave, Chicago 14, Ill.

New Ace Film Scraper

Designed to give uniformly clean surface to film before splicing, the Ace film scraper, a product of Ace Electric Manufacturing Co. of New York, is now ready for distribution through theatre equipment dealers and camera stores.

This new scraper removes emulsion without the use of water and scrapes dry, which assures a good splice that will hold. A case-hardened, serrated steel blade assures a patching surface without ragged edges or emulsion-laden spots. Held against the center plate of the splicing machine and moved back and forth several times, it completely removes the emulsion and provides a clean, even surface.

It is available in three sizes: 5/32", 1/10" and 1/16" for use on 35-mm, 16-mm and 8-mm film and can be used with all types of film splicing devices.

RCA Equips 13 Television Stations

With the delivery of three RCA 5-kw television transmitters last week, the number of postwar RCA-equipped television stations rose to a total of thirteen. The three stations receiving equipment last week were WBAL-TV, Baltimore, Md.; WATV, Newark, N. J., and the Evening Bulletin television station (call letters unassigned) at Philadelphia, Pa.

WBAL, operated by the Baltimore News-Post, will broadcast in Channel 11, between 198 and 204 megacycles. WATV, New Jersey's only television station, will be the first high-power transmitter in the country to operate in the highest frequency channel assigned to television, Channel 13, between 210 and 216 megacycles. The new Philadelphia station will be located atop the Savings Fund Building, the highest usable location in the Quaker City, and has been assigned Channel 10, between 192 and 198 megacycles.

For You, Mr. Projectionist



The 8mm projector which presented the first movie made, April 23, 1888.

With this, the "unseen showman" got his epoch-making start . . .



THE projectionist has come a long, long way since the 1870's when he put on his show with equipment such as this. And today, as then, much of a movie picture success depends upon the unseen showman in his booth. To be sure some of the most famous members of a famous family started more than fifty years ago.

EASTMAN KODAK COMPANY
ROCHESTER, N. Y.

J. R. BRULATOUR, INC., DISTRIBUTORS
FORT LEE • CHICAGO • HOLLYWOOD

WE REPRODUCE here with no little pride in the craft that we serve, a recent advertisement of Eastman Kodak Company which testifies anew to the importance of the projectionist in the scheme of things motion pictures. Further comment anent this exposition of a comprehensive understanding of what makes motion pictures tick—from the raw stock in the camera to the theatre screen—is rendered superfluous by reason of the source of this example of enlightened industrial advertising.

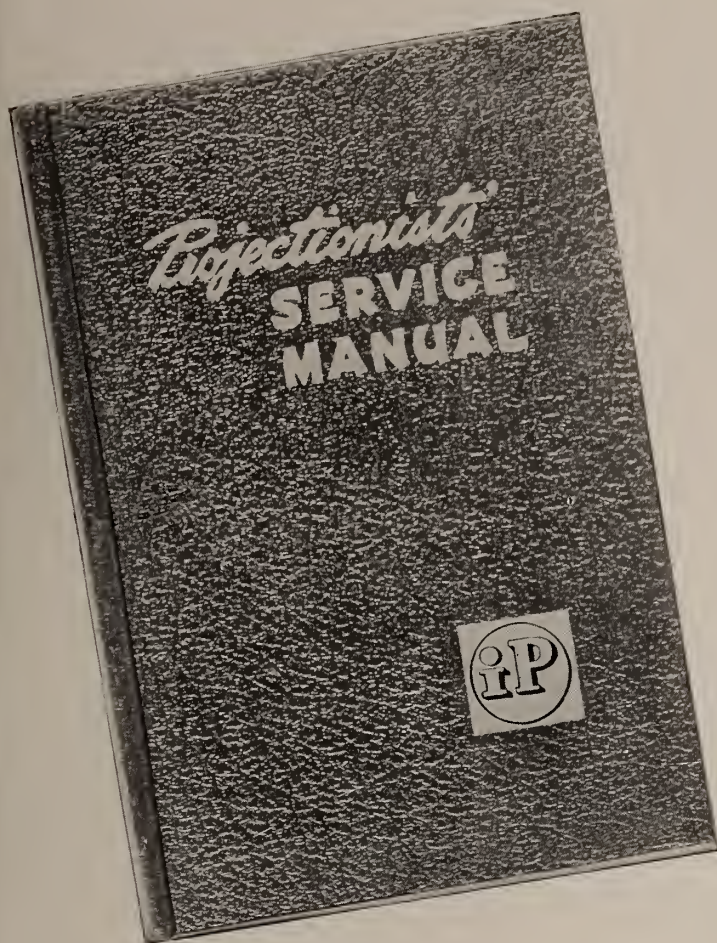
In addition to the Type TT-5A transmitters, each of the three stations has ordered an RCA mobile television unit, image orthicon camera chains and microwave relay equipment for remote telecasts.

Other stations having already received RCA equipment include WNBW and WMAL-TV, Washington, D. C.; KSD, St. Louis; WFIL, Philadelphia; WTMJ, Milwaukee; WLW, Cincinnati; WBZ, Boston; WBEN, Buffalo; KOB, Albuquerque, and WMAR, Baltimore.

Technicolor Net Earnings Doubled

Technicolor's net for the third quarter, ending September 30, 1947 is estimated at \$692,000, equivalent to 76 cents per share; in comparison with \$286,800, equivalent to 31 cents per share for the corresponding 1946 quarter.

According to Dr. Herbert T. Kalmus, Technicolor president, net before taxes for the nine-month period ending September 30, is estimated at \$1,932,000 in comparison with \$919,700 for the same period last year. This is equivalent to \$2.11 per share as against \$1.01 per share last year.



SO MUCH

for so LITTLE

\$ **3.00**
per copy
postage prepaid

Every projectionist should know the whys and wherefores of his projection room equipment. He should know what to do and what not to do when his equipment fails to function properly, and how to keep the show going until the service inspector arrives at the theatre. **PROJECTIONISTS' SERVICE MANUAL** is a

complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only \$3 per copy, postage prepaid.

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FEBRUARY

1948

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VOLUME 23

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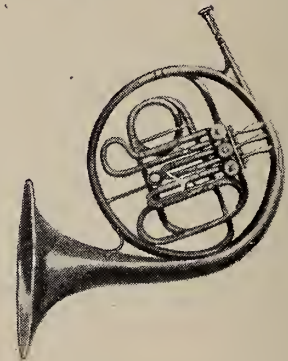
3.



4.



4.



Match up the people and the horns

(It may mean money to you!)

THE FIRST THREE, of course, are very easy.

The sea captain (1) goes with Cape Horn (3); the musician (2) with the French horn (4); and the pioneer (3) with the powder horn (2).

That leaves the Average American (4) matched up with the Horn of Plenty (1).

As such an American, you'd like that

to be true, wouldn't you?

It can be—and will be—for millions of Americans who, today, are putting money regularly into U. S. Savings Bonds.

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For they'll get back \$4.00 for every

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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING



HENRY B. SELLWOOD, Editor

Volume 23

FEBRUARY 1948

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MONTHLY CHAT

PROJECTIONISTS will have to be increasingly watchful for acetate prints, according to advices direct to IP from film stock manufacturers which indicate that production of acetate has slipped into high gear and has exceeded even the most optimistic estimates of last Fall. One thing is certain: nitrate stock is definitely on the way out as the standard release print.

In preparation for the impending deluge of acetate prints, Eastman Kodak Company is now engaged in an extensive educational campaign to acquaint the field with the requisites for handling acetate stock. This program, intensive though it be, of necessity is restricted to exchanges, which in turn are to be depended upon to adequately service all theatre accounts. We assume that this service will take the form of enclosing in the film cases a notice which will, first, emphatically identify the print as acetate stock and, second, will give instructions for proper handling, including splicing procedure.

This plan leaves much to be desired. Exchange management has never been overly concerned with the physical aspect of its operations, and there is the additional complicating factor of the human element and the wide margin of probable error inherent in relying upon film inspectors for the inclusion of such notices in every outgoing shipment.

This leaves the projectionist pretty much on his own—as always in theatre-exchange relations. The current M-G-M release "If Winter Comes" (Walter Pidgeon-Deborah Kerr) provides an interesting example of just how the projected plan will work out in practice. How many projectionists know that *all release prints* of this feature are on *acetate stock*? M-G-M exchanges have been given specific instructions as to handling this print, but will they follow through so that not even the last-run theatre will be neglected?

It might be noted, in passing, that the release of "If Winter Comes" on acetate film was accomplished surreptitiously, and that IP, which relied upon repeated positive assurances that it would be notified of the issuance of any substantial amount of acetate stock, learned about this feature quite by accident. This may be a portent of what will happen in the exchange field when such prints are more widely circulated.

IP is not particularly concerned about this matter in terms of the first-run, or even second-run, theatres: these fellows have always enjoyed preferential treatment because of the widespread mistaken notion that, because of their large "takes" and comparatively large rental payments, they are the only ones that count. They count, sure, and particularly because they are the industry show-windows, so to speak. But the subsequent-run the-

(Continued on page 34)



ROTATING ARC

NON-ROTATING ARC

Spot Rainbow!

THE BRILLIANT crater in the positive carbon of a "National" High Intensity Carbon arc, regardless of size or type, contains all the elements of an invisible rainbow.

Direct this white light through a prism and you can see! The beam breaks up into a vivid spectrum—bands of red, orange, yellow, green, blue, violet—with approximately equal values in all bands.

This "spot rainbow" insures the projection of your color pictures on the screen in the full rich colors your patrons want and expect. The best film ever made is worthless without a light of the proper color balance.

No other light source for film projection can match the almost perfect color distribution found in "National" High Intensity Carbon arcs. No other "point source" packs so much light into a small area. For example, the quarter square inch area in the positive crater of a 170-ampere High Intensity arc emits more light than 75,000 brightly burning candles. Your patrons get excellent color and clear bright visibility. They like it!

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New York, Pittsburgh, San Francisco*



THE ANATOMY OF NITROCELLULOSE FILM:

Its Import to the Projectionist

THE best fire preventive in the projection room is the vigilance of a skilled projectionist. Safety devices, fire extinguishers, insurance regulations, *et al.*, important as they are, possess slight value when unauthorized, inexperienced, and otherwise unqualified "hacks" are permitted to work in projection rooms.

The competent projectionist is always alert to the hazards inherent in nitrate film projection—it is a vital part of his job. He seeks to understand the causes of film fires, the nature of the combustion, and methods of preventing accidents and of meeting emergencies. Can as much be said of the majority of exhibitors, fire authorities, and the various "official" insurance and labor boards?

The exhibitor protects his own interest through insurance policies and by constructing a fireproof enclosure for the projection apparatus—although this latter precaution is compulsory rather than elective on his part. First-class projection facilities and competency are seldom considered by Mr. Exhibitor to constitute the best protection his theatre and its audience can have. Tragedies such as the death of Marion Joseph Shea are speedily and conveniently forgotten by the unscrupulous pillars of the theatre business.*

Chemistry of Nitrate Film

Some knowledge of the chemical properties and other characteristics of nitrate film is valuable to the projectionist. This

By ROBERT A. MITCHELL

information, needless to say, forms an important part of his technical background.

WHY FILM BURNS.—Nitrate film burns violently because it consists largely of nitrates of cellulose, compounds which are chemically unstable at elevated temperatures and which furnish their own oxygen for combustion. This means that they are *capable of burning in the absence of air*.

CHEMICAL RELATIVES OF FILM.—Closely related to nitrate film is guncotton, a nearly pure mixture of the higher cellulose nitrates (cellulose hexanitrate predominating). Nitrate film base is prepared from *pyroxylin*, a mixture of the lower cellulose nitrates (chiefly the tetranitrate). Pyroxylin is not so readily explosive as guncotton—but it is explosive.

CELLULOSE: ITS NITRATION.—Paper, cotton, and wood are familiar forms of cellulose. When any of these is treated with a mixture of strong nitric and sulfuric acids it undergoes a chemical change known as *nitration*. Because the cellulose nitrates formed in this reaction are nitric acid *esters*, not true *nitro compounds*, the often-used term "nitrocellulose" is somewhat of a misnomer.

MANUFACTURE OF FILM BASE.—Nitrate film base (film with the emulsion scraped off) is a *plastic* best known by the name "celluloid". It is made by mixing two parts of pyroxylin (the cellulose nitrates)

with about one part of camphor, adding traces of "plasticizers" and "stabilizers," and dissolving the mixture in a solvent which evaporates during the process of forming the film on large polished steel cylinders.

Combustion of Celluloid

IGNITION TEMPERATURE OF CELLULOID.—Pure celluloid of the type used for film ignites when touched by open flame or when heated in excess of 300° F., its approximate "flash point". (The temperature of the glowing tip of a cigarette is somewhat higher than 1,000° F.) The total amount of heat (not temperature) produced by burning celluloid is about the same as that of burning paper (8,000 Btu's per pound). Celluloid, however, burns so much more rapidly than paper that a very much higher temperature is produced during combustion.

TEMPERATURE OF COMBUSTION.—The temperature produced by burning celluloid is extremely variable, a large mass of the substance attaining a higher temperature than a small one. An ample supply of air also facilitates burning, thus increasing the temperature. 4,000° F. may be reached in the hottest celluloid fires. (The crater temperature of the low-intensity carbon arc is about 6,000° F.)

RATE OF COMBUSTION.—The initial rate of combustion of celluloid is about five times that of paper, but since the rate of burning increases with the combustion temperature, a large mass of celluloid—such as constitutes a reel of

* See "In the Spotlight," IP for June, 1947, p. 18.

film—ultimately acquires an almost explosive degree of combustion.

Actually, however, *celluloid does not and cannot explode*, either by ignition in a confined space or by percussion. This seems unusual when we stop to consider that guncotton and pyroxylin, both of which burn only slightly more readily than celluloid itself, explode with tremendous violence when struck sharply. (Guncotton sometimes explodes when merely scratched!)

The failure of celluloid to exhibit the properties of a true explosive is attributed to its camphor content. To what, then, may reports of film "explosions" be ascribed? (We may ignore the euphemistic fabrications mouthed by some exhibitors and lax fire officials.)

Celluloid Degradation Gases

CASES OF INCOMPLETE COMBUSTION.—Celluloid in a sufficient supply of oxygen burns to form three colorless, odorless gases; *viz.*, carbon dioxide, water vapor, and nitrogen. These gases are non-poisonous, but they can suffocate by excluding the oxygen in the air from the lungs. Under ordinary conditions, however, celluloid—much less gelatin-coated film—*never* burns without degradation into far more dangerous products.

When celluloid is partially confined, as by being enclosed in a container or coated with a less combustible substance, the flame is to some extent smothered because of an inadequate supply of air. But violent chemical reactions continue apace. Some of the unburned celluloid is decomposed by heat into additional gaseous products. (As a matter of fact, the decomposition temperature of celluloid is about 200° F., 100 degrees *below* the ignition temperature.)

The following typical analysis shows by what proportions the celluloid degradation gases are usually present:

Carbon monoxide	47%
Hydrogen	18
Methane	16
Carbon dioxide	14
Nitrogen	5
	100%

EXPLOSION OF CELLULOID GASES.—Of the decomposition gases all are highly inflammable except carbon dioxide and nitrogen. Now, any mixture of air with from 9 to 30% of the celluloid gases constitutes an *explosive mixture* which needs only a spark or flame to set it off. This solves the mystery of those few instances wherein film *seems* to explode: it is the gas produced by the *partial combustion of film* that explodes.

Effect of Emulsion on Film Combustion

Up to this point only the flammable properties of pure celluloid have been discussed. Motion picture film has, in

addition to the celluloid base, a coating of gelatin which serves to carry the black finely-divided silver particles which make up the soundtrack and picture image. The presence of this emulsion considerably modifies the burning.

In the first place, the emulsion slows the combustion of the film base, rendering the fire less violent and increasing the concentration of explosive, poisonous celluloid gases.

Second, whereas pure celluloid leaves little or no ash when it burns, the emulsion of coated film carbonizes to form a voluminous black ash which, of course,

contains all the metallic silver of the film. When film burns in the projector, decomposition products of the gelatin deposit as a tar upon the relatively cool metal parts.

Thirdly, the emulsion contributes a dense *smoke* to the colorless (invisible) gases produced by the burning celluloid. Of the celluloid degradation gases themselves, only carbon monoxide is a deadly poison; the others are deleterious by reason of their suffocating nature. The choking fumes of the smoldering gelatin contain appreciable quantities of am-

(Continued on page 25)

SMPE-ACADEMY TEST REELS AVAILABLE

Test Film	Code No.	Length (in Feet)	Price
35-Mm Visual Test Film	VTF-1	450	\$ 17.50
Focus-and-Alignment Section	VTF-FAS	100	5.00
Travel-Ghost Target Section	VTF-TGS	100	5.00
Jump-and-Weave Target Section	VTF-JWS	100	5.00
35-Mm Theater Sound Test Film	ASTR-3	500	17.50
35-Mm Multifrequency Test Film			
Type A—Laboratory Type	APFA-1	450	25.00
Type B—Service Type	ASFA-1	300	17.50
35-Mm Transmission Test Film	TA-1	250	17.50
35-Mm Buzz-Track Test Film	ABZT-1	50 min*	0.04/ft
35-Mm Scanning-Beam Illumination Test Film			
Type A—17 Position Track	A17P-1	230	12.50
Type B—Snake Track	AST8-1	8	0.50
35-Mm Sound-Focusing Test Film			
Type A—9000-Cycle Track	A9KC-1	50 min	0.035/ft
Type B—7000-Cycle Track (Area)	A7KC-1	50 min	0.035/ft
Type C—7000-Cycle Track (Density)	D7KC-1	50 min	0.035/ft
Type C—Acetate Base	D7KCS-1	50 min	0.04/ft
35-Mm 3000-Cycle Flutter Test Film	A3KC-1	50 min	0.05/ft
35-Mm 1000-Cycle Balancing Test Film			
For Two Machines	ABL2-1	14	0.50
For Three Machines	ABL3-1	21	0.75
1000-Cycle Test Film	ABLN-1	50 min	0.035/ft
35-Mm Multifrequency Warble Test Film	APWA-1	450	25.00
16-Mm Sound-Projector Test Film	Z52.2	200	12.50
16-Mm Multifrequency Test Film	Z22.44	150	41.25
16-Mm Buzz-Track Test Film	Z52.10	100	27.50
16-Mm Scanning-Beam Illumination Test Film			
Laboratory Type	Z52.7-L	100	27.50
Service Type	Z52.7-S	100	27.50
16-Mm Sound-Focusing Test Film			
Laboratory Type	Z22.42-7000	100	27.50
Service Type	Z22.42-5000	100	27.50
16-Mm 3000-Cycle Flutter Test Film	Z22.43	380	104.50
16-Mm 400-Cycle Signal-Level Test Film	Z22.45	100	27.50

*Minimum.

Black-and-White vs. Color Cinematography

By JOSEPH VALENTINE

Member, I. A. Cameramen's Local 659, Hollywood

IN more than 25 years of camera work the highest key of lighting I ever used in black-and-white photography turned out to be the lowest key in the history of Technicolor. That was my introduction to color on "Joan" (Joan of Arc) for Sierra-RKO, directed by Victor Fleming and starring Ingrid Bergman.

Far from the fancy phrases of an expert, this piece merely attempts to tell my rambling impressions on making the transition from black-and-white to color photography.

The first thing I discovered, in spite of the picture being in low key, was that 10 light units must be used in color for two in black-and-white. This produced a headache. Color gradations change perceptibly with the slightest change in the intensity of light. Overlight a face and it will film red; underlight it and it becomes green. I found that the mood and effect shots could be made 10 times as effective in color, but the intensity of light must be watched 10 times as closely as in black-and-white.

There is one scene in "Joan" in which a constable, in the dead of night, accosts Miss Bergman on the road. He holds up his lantern to see her on horseback. In

black-and-white his face could be as low or as high as we wanted it for mood. Had we keyed too low in color his face would become green and unreal.

Except for my hawk-eye on intensity, one key light is still as good in color as in black-and-white for modeling faces. No need to use four or five units. Not only does it serve the purpose artistically but it gives lower balance, cuts down the heat, and is more comfortable for the actors, keeping them from squinting and being less harmful on the eyes.

Separation Comparatively Easy

The happiest thing about color is separation. My daffiest moments in black-and-white were spent trying to separate a wall from a staircase. In color one just sits back and relaxes. Separation is done for one by the *actual color difference* of a staircase and a wall. One gets what one sees; one doesn't have to create it.

The fact that color means automatic separation is the big difference for a cameraman changing from black-and-white to color. Actually one can throw a flat light in Technicolor and still get effect and separation.

A happy discovery was that I could

Reaffirmation of the old adage "If it isn't on the film it can't be on the screen" is contained in the accompanying article by a veteran Hollywood cameraman who has had extensive experience on both black-and-white and color feature film production.

The close ties between camera work and screen results were strikingly illustrated in a promotional campaign conducted several years ago by National Carbon Company. The central theme of this campaign, pointed up by both text and illustration, was the need, as N. C. C. saw it (and effectively demonstrated), for utilizing in the theatre the same type of light source (in this case the carbon arc) that was used in photographing the production.

IP has long held that many aspects of production have an important bearing on the quality of the projected screen image, and to this end it will continue to present articles bearing on this close relationship. The accompanying article, reproduced here through the courtesy of INTERNATIONAL PHOTOGRAPHER, serves admirably to emphasize this interdependence of one craft upon the other.

light to f:2, the same opening I use in black-and-white, and get an exceptional third-dimensional quality.

A groundless fear was my apprehension about the dimmers and control of key lights. With one exception. I found the use of dimmers to be exactly the same as in black-and-white. When dimming low on incandescents the intensity gives more red. Actually we used less color gelatines on lights in "Joan" than any color picture has used to date. Which brings up again the question of this picture having been shot in the lowest key of color history.

Color Establishes Mood

When I looked at the sets before the actual shooting started I thought I was back in black-and-white. Throughout the picture we kept the color muted. Most of the sets are drab, with an occasional touch of blue. Red was used at a minimum because it is too blatant.

At the same time we were able to make color carry the mood of the picture. The action builds from an opening low key in the enemy-scorched Domremy through



Actors, supervisory personnel, technicians and equipment units assembled on set. Out of this seeming confusion will emerge a smooth, expertly-lighted film image.

Joan's fight for recognition and her victorious battles to the climax of the coronation scene, which, of course, is in brilliant color.

The opening shot was in such low key that the color will be barely discernible. Then with each new success of Joan's the color builds until the coronation becomes the highest key in the picture with the beautiful vestments of the priests and colorful costumes of the knights and court ladies, the many religious banners and the magnificent interior of the Cathedral.

Color Lighting Flexibility

The color drops again beginning with Joan's capture and ending with the trial sequence and the prison at Rouen. The same low key is used as in the beginning of the picture. Color will rise at the end only with Joan's burning at the stake. The flames and the executioner's robe will be the high-key elements standing out in the market square.

Establishing mood is the greatest thrill in Technicolor. As in black-and-white, it is a matter of lighting, but the difference is that color gives you so many more gradations and delicate changes.

For example, the picture opens at dawn. In black-and-white dawn could merely be suggested. The atmosphere at that precise moment could not be reproduced. We could never achieve the cool pink dawn sky and the first breaking of orange light through the blackness that covered the village of Domremy. A few pink gelatins on the sky background and in Technicolor one can reproduce just those colors. A true dawn with every nuance of color, exactly as it is at 4:30 in the morning.

Realistic Color Obtained

In black-and-white the best one can do with atmosphere is an approximation in the changing season and the changing hours of the day. One can only repro-

Ordered disorder is this production shot.



Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, A. F. of L.

XII. Birth of the American Federation of Labor

WITH the birth of the American Federation of Labor in 1881, there began a fiercely conducted attack upon it by the Knights of Labor. The Federation weathered the attack. As it proved its supremacy, the Knights—slowly at first, then rapidly—passed out of the picture.

Among the reasons for the failure of the Knights of Labor were their partisan political efforts, the results of which proved disappointing to their membership, and their strenuous attachment to the "mixed assembly" form of organization. In practice, the latter proved much less efficient in protecting workers in their employment than the national and international unions.

Craft vs. Industrial Unions

American workmen as a whole have always responded more quickly to practical results than to theoretical considerations. The efficiency of the unions composing the American Federation of Labor as compared with the meddling and fumbling of the Knights led many of that organization to seek membership

duce the broad changes, either day or night. But in Technicolor one can get true reproduction of any hour of the day and any given part of any season—changes in the color of the soil, changes in leaves, in the sky.

I found even in the battle scenes that we could reproduce the various colors of smoke that are part of any battle. In fact, some of the changes became so violent that the smoke colors clashed and

in the national and international unions. But this did not change a number in their belief in industrial unionism.

As the Knights passed out of existence, the Federation busied itself in organizing and chartering new international unions. Many of their members and officers had been active in the Knights. This led to spirited debates in the annual conventions of the Federation over the question of craft versus industrial organization.

These discussions were largely academic, for in the A. F. of L. each union was free to adopt the form of organization its members favored, provided that it did not use its program as a justification for raiding the membership of other affiliated internationals.

Actively assisting these former Knights were the Socialists holding office in some of the internationals. They strove vigorously and unceasingly to prevail upon the Federation to adopt at least the industrial union plank of their political platform. They also were in open opposition to the Federation's non-partisan

(Continued on page 27)

we had to reduce them to yellow, black and grey—no white.

That is the story, except to say that I've been able to hold one boast good from black-and-white to Technicolor. I still come within 25 foot-candles on the meter with my naked eye, and come within 1½ to 2 points printer range on the entire picture. After all, balance is balance, whether you photograph in black-and-white or in color.

Lining up cast, equipment for coronation scene.



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IS THAT OF
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"THERE'S A BRANCH NEAR YOU"

Toxicity of Carbon Arc Gases[†]

With Supplementary Notes on Projection Room Ventilation Requirements

BECAUSE of his interest in ventilation and air-conditioning problems, Dr. E. L. Mac Quiddy of Omaha prompted the Nebraska State Labor Commission to make a survey of the motion picture projection rooms in the State. The Commission did this and besides ran some experiments with the arc itself. The results of their study were published in 1936.¹

They found that oxides of nitrogen were given off by the electric projection arc and they stated that there was a possibility of the oxides of nitrogen reaching disagreeable, if not toxic, concentrations in poorly ventilated motion picture projection rooms. They stated further that an investigation of such rooms in the State showed that most of them could be classified as poorly ventilated.

Fellowships were set up at the Harvard School of Public Health and at the University of Nebraska College of Medicine for the purpose of determining the combustion products of the arc, the effects of inhalation of the arc fumes, and the proper methods of ventilation of rooms where arcs are used. Some of the results of these investigations were published in the April, 1938, issue of the *Journal of Industrial Hygiene*.²

Test Apparatus Used

The main apparatus, used in the study of the arc fumes and their effects, consisted of an arc lamp of latest design and in common use in motion picture projection rooms. The lamp was operated on d. c. of from 40 to 55 amperes and 28 to 36 volts. The electrodes were high-intensity 7-mm positive and 6-mm negative copper-coated carbons.

Fumes from the arc were exhausted by means of a 5-inch flue attached to connections provided on the lamphouse. A fan was arranged to draw a current of air through this flue system and discharge it out-of-doors. The fumes, after leaving the arc housing, were conducted through a cooler to bring the temperature to 25° to 28° C. before passing to the animal's exposure chamber, which

By LEROY W. LATOWSKY, M.D.

Philadelphia (Penna.) General Hospital

chamber was inserted in the exhaust flue line.

In later experiments this apparatus was modified by inserting a filter in the flue line to take out the particulate matter in the arc fumes. Another piece of apparatus was a specially constructed chamber in which animals were exposed to the particulate matter, devoid of the gases, arising from arc combustion.

Air flow through the arc apparatus varied from 3.8 to 9.4 cu. ft./min. In analysis of the fumes both gaseous and particulate matter were encountered. The particulate matter in the arc fumes on chemical analysis revealed the composition of the ash (Table I).

Animal Exposure Conditions

Several groups of animals were subjected to various conditions of exposure to the arc products. In all cases animals were subjected to the highest concentrations of arc substances which were possible to attain with the apparatus used. During the course of the study the various conditions of exposure to the fumes were:

1. Exposure to gross arc fumes (gaseous and particulate matter). Acute and chronic exposure.
2. Exposure to filtered arc fumes (gaseous matter only, ash filtered out). Acute and chronic exposure.
3. Exposure to the ash alone.
4. Exposure to concentrations of NO₂, generated from copper and nitric acid, simulating the concentration range found in the arc flue.

In the group subjected to acute con-

tinuous exposure to gross arc fumes were 14 animals, including mice, rats, guinea pigs, rabbits, and cats. Twelve of the animals were dead in from 1 to 22 hours.

The animals showed the spectrum of methemoglobin in their blood samples, and a lung edema clinically and microscopically. The guinea pigs showed a polymorphonuclear leukocytosis, and in those two surviving, the leukocytosis subsided in a week. There were no residual lung changes in the two animals surviving.

In the group subjected to chronic exposure to the gross arc fumes there were 5 rats and 5 guinea pigs. These animals were exposed for 1 hour per day, 6 days a week to the fumes.

Of these animals all 5 of the rats died in from 11 to 38 weeks, showing various stages of acute, sub-acute, and chronic inflammatory process in their lungs. Of the 5 guinea pigs none died in a period of 10 months' exposure. Their blood samples showed no changes, the lungs showed no changes, and the animals gained weight.

Another group of animals was exposed for 4 hours per day, 6 days a week, to the gross arc fumes. Nine rats and 12 guinea pigs were included in this group.

Of the 9 rats all were dead in from 1 to 16 weeks, showing various stages of acute, sub-acute, and chronic pneumonitis with fatty degeneration, abscesses, and gangrene. Of the 12 guinea pigs 11 died in from 2 to 8 months. Each animal showed a polymorphonuclear leukocytosis at death.

All animals showed the spectrum of oxyhemoglobin in their blood samples. Histologically the animals showed acute paranasal sinusitis, patchy atelectasis, pneumonitis, fatty degeneration, and dust phagocytosis in their lungs. There were fatty changes in the livers.

Particles Filtered Out

The same types of exposure were repeated, but the particulate matter was filtered out of the fumes by the combined use of an oiled spun-glass filter and a felt filter. To these filtered fumes, consisting of the gaseous elements of combustion, 12 guinea pigs were exposed 4 hours per day for 7 months. In from 1 week to 7 months 6 of the animals died, showing pneumonitis, patchy atelectasis,

TABLE I.
Chemical Composition of Ash
From the "Suprex" Carbon Arc

Substance	Sample 1 Per cent	Sample 2 Per cent
Silicon dioxide.....	1.79	1.21
Rare earth oxides....	65.70	71.80
Ferric oxide.....	2.26	1.46
Calcium oxide.....	.53	.20
Potassium oxide.....	2.26	2.38
Sulphur trioxide....	2.35	2.98
Phosphorous pentoxide	.17	.15
Fluoride	10.65	11.31
Boric anhydride.....	.50	.60

[†] American Journal of Public Health. August, 1939.

¹ Department of Labor, State of Nebraska, Ventilation of Theatre Booths. Twenty-sixth Biennial Report of the Bureau of Labor. June 1, 1935, to Dec. 1, 1936, p. 7.

² MacQuiddy, E. L., Tollman, J. P., La Towsky, L. W., and Bayliss, M. L. The Combustion Products of the Carbon Arc, and The Biological Effects of Inhalation of Carbon Arc Fumes. *J. Indust. Hyg.*, 20:297-320, 1938.

and a very few dust phagocytes.

Ten rats were exposed 4 hours per day to the filtered arc fumes. All 10 were dead in from 1 to 4.5 months' exposure. Sections of the lungs showed pneumonitis, abscesses, a very few dust phagocytes, and an hyperplasia of the lymphoid tissues.

Ten animals, including mice, rats, guinea pigs, and rabbits, were exposed acutely and continuously to the filtered arc fumes. Eight of the animals were dead in from 2 to 22 hours, showing methemoglobinemia and lung edema.

The findings in the animals subjected to the filtered fumes were identical with those findings in the animals exposed to the gross arc fumes except that in the latter there were many dust phagocytes.

Pure NO₂ Inhalation

In order to compare the effects of inhalation of arc fumes to the effects produced by the inhalation of small quantities of pure NO₂ a group of animals was exposed to NO₂ generated from copper and nitric acid in a concentration range simulating that in the arc exhaust flue.

Twelve guinea pigs were exposed 4 hours per day to NO₂ in a concentration range of from 100 to 200 parts per minute. All the animals died in from 3 weeks to 7 months, showing pneumonitis, atelectasis, and emphysema. Ten albino rats were exposed in the same manner. All died in from 1 week to 4 months, showing lung edema, pneumonitis, and patchy atelectasis.

Various modifications of the electric arc are used under such conditions as motion picture projection, photo engraving, treating with ultra-violet and infra-red lamps, flood lighting with searchlights, and electro-welding. In most of the conditions mentioned the arcs are used in a closed space, and frequently in a small closed space. It is in those conditions of use of an arc in a small closed space without adequate ventilation that dangers from inhalation of the fumes of combustion arise.

First Toxicity Observations

The electric arc was discovered in 1812 by Sir Humphrey Davy. Shortly thereafter Cavandish discovered that the oxides of nitrogen were formed around the electric arc. The chemical process by which such a formation takes place has been well explained since today the arc process is one of the commercial methods of nitrogen fixation.

The credit for having made the first observation that the concentration of the oxides of nitrogen might reach toxic levels when electric arcs are being used should go to Dadlez, a Parisian physician, who in 1927 wrote that the concentration of oxides of nitrogen reaches levels which cause headache in operators and patients in rooms where electric arcs are

used for infra-red and ultra-violet therapy.

Considering the results of the various types of animal exposures as a whole, the findings in the gross fumes exposure group, the filtered fumes exposure group, and the pure NO₂ exposure group, strongly suggest that the oxides of nitrogen play the chief role in producing the evil effects of inhaling arc fumes.

Toxicity Levels of NO₂

The following figures as to levels of toxicity of NO₂ seem to be generally accepted:

	Parts per minute
Allowable concentration..	39
Allowable one half hour..	78
Directly dangerous	117 to 156
Rapidly fatal	780

Calculations show that a high-intensity lamp in an unventilated room of 1000 cu. ft. will bring the concentration of NO (nitric oxide) to 125 p.p.m. in 11 minutes. While with a white flame carbon arc using 1400 watts, over 2 hours would be required to attain this level. These calculations are based on the assumption that no ventilation at all would occur.

The findings of lung edema in acute

exposure, and various lung inflammatory conditions in chronic exposure to the arc fumes fit in with the current knowledge of the effects of exposure to the group of irritant gases of which NO₂ is a member.

The methemoglobin found in the blood samples of the animals acutely exposed to the arc fumes results from the action of NO₂ on the moist mucosa of the lung in which reaction nitric and nitrous acids are formed. The nitrite ion is absorbed into the blood stream and its action on the hemoglobin causes the formation of methemoglobin.

Various Clinical Findings

The nitrite ion may also cause a drop in blood pressure with resultant cerebral anemia. This latter action could explain the clinical condition of headache in persons exposed for too long a time to too great a concentration of the arc fumes. However, such a concentration could not be reached in properly ventilated projection rooms.

The lung edema which occurred in those animals acutely and continuously exposed to the arc fumes results from injury to the capillary walls by the irritant gas with a resultant physiologic

(Continued on page 22)



Editor, International Projectionist.

Anent the suggestions relative to round corner screen image made by Mr. Mitchell in your December issue,* it has been my experience that such corners give the illusion of greatly restricting the total area of the picture. As long as we have to use masking I favor the square corner—and it would seem that the overwhelming majority of projectionists are of the same opinion.

Probably the best system would be the one described in IP some years ago wherein some of the screen light spills over the edges of the picture, is diffused and reflected back to give a picture boundary that varies with the lighting and action in the scene.

WILBUR FLAHERTY

Local Union 389, Fort Dodge, Iowa.

[Mr. Flaherty refers to a proposal advanced some years ago by Mr. Ben Schlanger, noted theatre architect, which involved elimination of the sharp screen masking cutoff, now universally used, thus permitting the light to splay off onto the sheet on all sides of

the projected image. Mr. Schlanger's suggestion was based on what he considered sound physiological and psychological reasons for the elimination of the sharp masking cutoff.

A modification of the Schlanger proposal was advanced by a visiting English technician at the most recent SMPE Convention.]

Editor, International Projectionist.

Small-scale experiments made by myself indicate (but do not prove) that the use of perforated sound screens is not necessary in the average theatre. Solid (unperforated) screens do not muffle the sound to the extent commonly supposed. Qualitatively, the effect is that of a top-cut in the hiss and surface-noise region (8,000 to 10,000 c.p.s.), and quantitatively the effect is very minor. An extra boost in the high-frequency output compensates for the former, and a slight advance in gain makes up fully for any loss of volume.

The most interesting thing is that the tone quality of the older systems having poor bass response and sharp, peaky high-frequency output is actually im-

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* "Experiment in Screen Masking." by R. A. Mitchell: IP for December, 1947, p. 25.

The Use of Selenium as a Rectifier

By SAMUEL WEIN

THE history of science is replete with references to the subsequent adaptation of an element or a process which bears little or no relation to the original conception of their utilization. Particularly is this true in the realm of chemistry and physics wherein subsequent applications of physical phenomena resulting from findings associated with certain elements resulted more from pure chance than from any intensive research in a laboratory.

The element *selenium* is a prime example of this operation of the law of chance. It was discovered in 1817 by J. J. Berzelius purely as a sort of by-product of the manufacture of sulphuric acid—the selenium turned up as sediment in the bottom of the vat. Selenium is grouped chemically with sulphuric acid because its chemical and physical properties are alike in many respects.

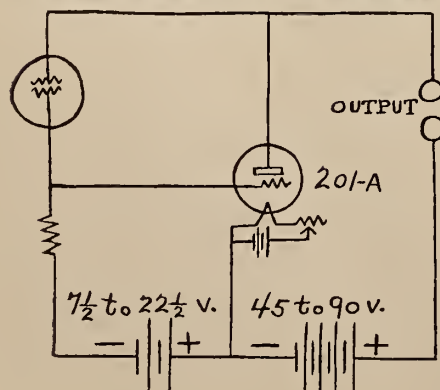
Willoughby Smith, an electrician employed by a cable telegraph company at a station in the Azores in 1871, needed a material that had an extremely high electrical resistance in a given circuit. He was persuaded to utilize bars of selenium for this purpose because of its extremely high ohmic (resistance) value.

Chance Reveals Light-Sensitivity

During a testing operation the lid of the box containing these selenium pencils was inadvertently removed. To the great surprise of those present, it became apparent that a sudden change in the electrical resistance of the selenium took place. When the lid was replaced on the box the resistance of the selenium returned to its normal value.

In order to determine whether some cause other than the action of light was responsible for this variation in resistance value, the selenium bars were placed in a trough of water and exposed to a source of light. Precisely the same change in resistance value was observed. As a

Circuit used in 1915 by Wein, which anticipated photocell application to sound pictures.



The recent announcement of the adaptation of selenium as a rectifier for motion picture projection occasioned no little surprise among practitioners of the art, since this element has been commonly classified as a light-sensitive medium. Just how versatile an element is selenium may be gleaned from the appended article contributed by one so well-versed in the art as to have earned over a period of 35 years the cognomen "Selenium Sam". Additional data will appear in an early issue of IP.

matter of fact, it was found that the more intense the light the greater was the change in electrical resistance—a remarkable discovery indeed.

Let us see how this discovery affected technological developments in the motion picture industry.

Alexander Graham Bell, inventor of the telephone (1880), took a metal disc and drilled a series of holes in it. This disc was mounted between a light source and a selenium cell which was connected in series with a battery and a telephone receiver. When the disc was revolved the spaces between the holes would naturally interrupt the light beam falling on the cell, thus giving rise to a musical pitch which would be a function of the number of holes and the speed with which they interrupted the light.

Thus it was proved that light could be converted into sound. Bell records the interesting observation that a fly interrupting the light beam gave rise to a pronounced "bang!" in the telephone receiver.

Bell's Photo-Conductivity

The next step by Bell was to mount tiny mirrors or diaphragms so that they would respond to the human voice, with the light variations therefrom being reflected onto a selenium cell which in turn was connected in series with a battery and a telephone receiver. Voice sounds were transmitted over a beam of light for a distance of several hundred yards.

In such a case the selenium cell exhibits a *photoconductive* effect in that its electrical conductivity (resistance) changes in conformity with changes in the light intensity to which it is subjected. Selenium cells are constructed in various form, sizes, etc., to satisfy the particular and varying demands made upon them.

The next interesting development was that of Simon in 1899, who conducted experiments with an oscillating arc circuit in which the crater of the arc was made to oscillate at a given frequency as well as with respect to light as a result

of the superimposition of a voice frequency produced by means of a microphone. Since the human eye was not fast-acting enough to respond to these frequencies the variations in light were photographed on 35-mm film.

In 1900-01 Ernst Ruhmer actually photographed sound on film and reproduced it by means of a selenium cell. In 1910 the writer heard the music of a German band reproduced from such a film. The reproduction was indeed crude, but it was definitely established that sound could actually be recorded photographically and reproduced by means of a light-sensitive cell—in this case, selenium.

Refinements in the art inevitably followed, notably those contributed by Eugene A. Lauste over a long period of years from 1910 to 1938. The literature shows that the writer in 1915 conducted exhaustive tests on the reproduction of sound-on-film by means of a selenium cell connected in series with an amplifier.

Barrier Cell Forerunner

During the time the selenium cell was undergoing a refining process, one Charles Fritts, of New York City, deposited a film of selenium on an iron disc and by means of a thin film of gold effected an electrical contact. Fritts found that no e.m.f. was required in the circuit to obtain a potential from the cell, this being accomplished merely by its exposure to light. This was the forerunner of the modern *barrier cell* which to this day is used in exposure and light meters in general.

All of the early investigators of the properties of selenium cells found that their resistance was greater in one direction than in the opposite, that is, there was a definite polarity effect and, further, that their electrical resistance changed with the applied potential up to a certain point. In other words, if we should take the Fritts type of cell having a definite polarity effect, stack a plurality of them and connect them in a bridge or other

(Continued on page 32)



She keeps the romance running smoothly...

THE spell of this picture's song and story might suddenly be broken . . . but for film row's "first lady," the exchange inspectress.

With unrelenting vigilance, she has inspected every inch of film before each booking...checked it for worn perforations, torn splices, and other signs of wear and tear that might hinder smooth projection and mar the enchantment of

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And her work is all the more easily done for the quality and reliability she finds in the release prints made on Eastman film.

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16-MM PROJECTION:

WHILE selection of 16-mm equipment is important, it is only one of the first steps in good projection planning. Location of the projector and screen in relation to the seating area, acoustics of the rooms in which the equipment is used, location of the loudspeakers, wiring for projectors and loudspeakers, equipment maintenance, and facilities for film storage are all important initial considerations.

Each room or area in which projection is planned presents its own problems. The auditorium with permanent seats, large screen, wide viewing area, carefully controlled lighting and ideal acoustical characteristics, presents a totally different planning problem from the individual setup, for example, with movable seats, small screen, restricted viewing area, and sometimes poor acoustical characteristics.

Location, Choice of Screen

It is difficult to answer these individual questions, but from RCA's long experience in projection practice some general comments are offered as a guide.

from Purchase to Picture

No series of helpful hints or mere touching-up of the high spots, this, but a full-dress, rock-bottom and comprehensive presentation of the requirements for good 16-mm sound projection. From choice and location of screen right down to the acoustic requirements of a given area, this abstract from "The Architects Manual of Engineered Sound Systems" (Sound Products Section of RCA) is another tribute to this compendium.

Optical considerations are the most important factors in locating and choosing the screen. It must be placed so that it is clearly visible from the entire seating area. This usually means the center front of the room, particularly where seats are not movable. Whenever possible and convenient, permanent location of the screen is recommended.

In addition to the pull-down type of screen for permanent locations, a tripod type portable screen is recommended for

use in areas in which a permanent screen is not provided.

The screen should be suspended high enough to permit an unobstructed path of light between the projector lens and the screen when the audience is seated. However, in rooms where the screen is located on the stage well above the heads of the audience, it should not be suspended so high that spectators in the front rows experience serious vertical distortion in the image. Moreover, fatigue results when the spectator must constantly look up at the picture from this angle.

Principal Screen Types

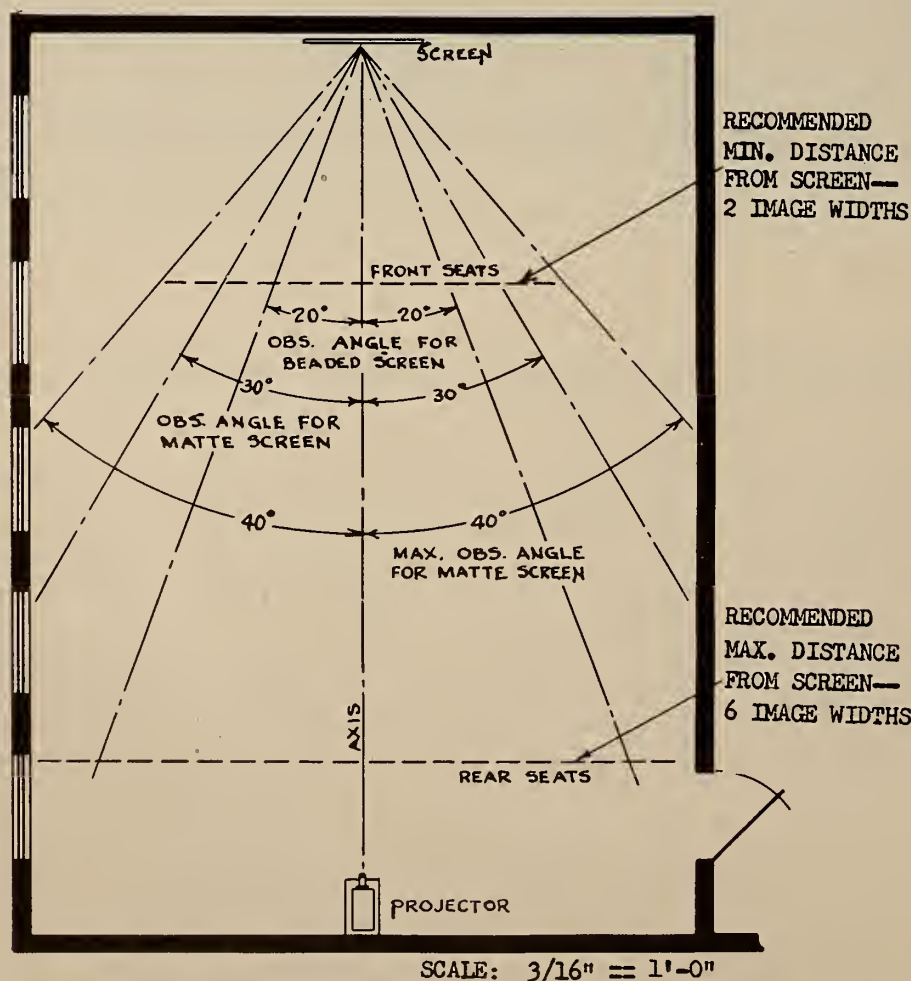
Screens are limited to two principal types: one with a beaded surface, commonly known as the white beaded screen; the other with a matte surface, commonly known as the white matte screen. Except for projection in long, narrow rooms and for cases where extreme screen brightness is desired (in which case the beaded screen is used) the white matte screen is preferred.

Although the beaded screen appears four or five times brighter than the matte screen along the axis from the center of the screen to the projector, its brightness diminishes rapidly as the observer moves away from the axis toward either side. Consequently, because its brightness diminishes rapidly at the outer edge of the viewing area, picture quality is not uniform throughout the audience.

The matte screen, on the other hand, while not as bright along the projection axis, does maintain a more uniform picture quality throughout the entire audience.

Screens may also be classified as perforated and unperforated. The unperforated screen is preferred in 16-mm projection because of its higher light reflectivity. The perforated screen loses approximately 10 or 15% of the screen illumination due to its perforations, and since most 16-mm projectors employ incandescent illumination as their source of light, they cannot usually afford this loss of illumination at the screen. Also, since

FIGURE 1



the 16-mm audience is generally close to the screen the perforated pattern may be visible and annoying.

Seating Arrangements

In the auditorium specifically designed for audio-visual screenings, seats are permanent and their location in relation to any stage or screen is usually planned to provide satisfactory viewing of the screen.

However, in the room not specifically designed as an auditorium and used only for occasional projection, seats should be placed within the area so that there is a minimum of adjustment of seats to provide good viewing. This is especially important in classrooms where the movement of children should be kept to a minimum. It is sometimes helpful to mark viewing areas on the floor.

The two limiting factors in arranging seats within the viewing area are (1) distance from the screen and (2) angle of perspective or observation angle. The width of image is usually used as a guide in determining distances of seats from the screen. Width of image is the actual width of the picture—not the width of the screen. (Height of image is very nearly in a direct 3:4 ratio to the width.)

Measuring from the screen toward the projector on the axis, the front line of seats should not be located closer to the screen than 2 image widths. (For the beaded screen the distance should be increased to 2½ widths.) The rear line of seats should not generally be located fur-

ther away from the screen than 6 image widths, although satisfactory viewing of the image may be secured at distances of 7 and 8 image widths.

The angle of perspective, and, therefore, the length of each row of seats is largely governed by the type screen used. When a beaded screen is employed, no one should sit outside an angle of approximately 20 degrees either side of the axis. As previously pointed out, brightness of the beaded screen diminishes sharply as one moves away from the axis, becoming unacceptable beyond 20 degrees, where the brightness falls to about one-fourth of its intensity at the axis.

With the matte screen ideal viewing is secured within a 30-degree angle either side of the axis, but this angle may be safely expanded to provide satisfactory viewing within an angle of 40 to 45 degrees. Beyond that point image distortion due to improper perspective becomes pronounced.

Determination of seating area in relation to the screen is illustrated in Fig. 1. Determination of ideal front and rear row lengths for both the matte and beaded screen under varying projection conditions is tabulated in Fig. 2.

Projector Location and Support

The ideal projector location is approximately 5½ image widths from the screen. This usually places the projector within the audience area. If it is desired to keep the projector out of the audience

area, experience has shown that the projector may be placed in the back of the room or just behind the last row of seats without any appreciable loss of image clarity or detail.

The projector support should be capable of holding approximately 85 pounds and withstanding the vibrations of a running sound and projection mechanism. The support should be high enough to permit an unobstructed path of light from the projector lens to the screen and should not be less than 4½ feet above the floor.

A sturdily built table or stand 12" x 24", whose top is 4½ feet high, is satisfactory. The inclusion of one or two shelves, hooks for cable, and film can pockets increases the utility of this unit. It may be quickly and inexpensively made mobile by mounting on 3" or 4" rubber-tired casters.

Projection Room Data

The more expensive type of shelf built into the wall of the room is not recommended. Frequently this permanent or semi-permanent shelf is not a satisfactory support, and if left open when not in use may interfere with aisle clearance and fire regulations.

Most 16-mm projectors employ incandescent illumination. Incandescent projection as compared with arc lamp projection offers the advantage of complete freedom from a permanent projection room, d.c. power supply for arc lamps,

FIG. 2. PROJECTION PRACTICE DATA FOR 16-MM SOUND FILM PROJECTORS

PICTURE SIZE	Minimum Viewing Distance	Maximum Viewing Distance	WHITE MATTE SCREEN			BEADED SCREEN			PROJECTION DISTANCE					
			Lamp Size*	Max. Front Row Length	Max. Rear Row Length	Lamp Size*	Max. Front Row Length	Max. Rear Row Length	1" Lens	1½" Lens	2" Lens	2½" Lens	3" Lens	4" Lens
22" x 30"	5'	15'	200W	6'	17'	100W	3½'	11'	6½'	10'	13½'	16½'	20'	26½'
30" x 40"	6½'	20'	300W	7½'	23'	100W	4'	15'	9'	13½'	18'	22'	26½'	35½'
36" x 48"	8'	24'	500W	9½'	28'	200W	6'	17'	10½'	16'	21½'	26½'	32'	43'
39" x 52"	8½'	26'	500W	10'	30'	200W	6'	19'	11½'	17½'	23'	29'	34½'	46'
45" x 60"	10'	30'	750W	11'	35'	200W	7'	22'	13½'	20'	26½'	33½'	40'	53½'
52" x 72"	12'	36'	750W	14'	42'	300W	9'	26'	16'	24'	32'	40'	48'	64'
63" x 84"	14'	42'	1000W	16'	49'	500W	10'	31'	18½'	28'	37½'	46½'	56'	75'
6' x 8'	16'	48'	1000W	18'	56'	750W	12'	35'	21½'	32'	42½'	53'	64'	85½'
7' x 9'	18'	54'		21'	63'	750W	13'	40'	24'	36'	48'	60'	72'	96'
8' x 10'	20'	60'		23'	70'	1000W	14'	44'	26½'	40'	53'	67'	80'	106'
9' x 12'	24'	72'		28'	84'	1000W	17'	53'	32'	48'	64'	80'	96'	128'

*Correct only for projection of black and white film in rooms having 1/10 foot-candle (or less) general illumination.

RUNNING TIME OF 16-MM SOUND FILM

Footage.....	100	400	800	1000	1200	1400	1600	2000
Time in Minutes...	2¾	11	22	28	33	39	44	56

and a separate ventilating system for arc lamps.

However, if the 16-mm sound film projector employing incandescent illumination is located permanently in a hall or auditorium, it may be operated from a projection room; if employing arc lamp illumination, it must be operated from a fireproof projection room. Therefore, if a projection room is contemplated, fireproof construction is recommended and it is suggested that the projection room be constructed large enough to accommodate two projectors.

The projection room should be located at the center rear of the auditorium as near screen level as possible, but it need not utilize any space which might otherwise be used for audience seating or rear aisle. If one or more balconies are incorporated in the auditorium, the projection room may be considerably above the screen level, but in no case should the vertical projection angle exceed 14 degrees. The projection room may be entirely within the auditorium or it may be so constructed that the rear wall of the auditorium becomes the front wall of the projection room.

In addition to the necessary a.c. power outlets and loudspeaker outlets, the pro-

jection room should include a control for the auditorium lights and the stage curtain and a monitor loudspeaker which duplicates the sound of the auditorium loudspeaker. Rewind and splicing facilities should also be included in this room.

A ventilating system separate from the building air conditioning or ventilating system must be provided for the projection room. A carbon arc exhaust system separate from the building ventilating system and separate from the projection room ventilating system must also be provided if arc lamp projection is contemplated.

Choice of Lens Important

The distance of the projector from the screen and the size image desired determine the choice of lens. The 2-inch lens meets the average conditions in most instances. However, sometimes a larger picture is desired in a small room, requiring a lens of short focal length; or a small picture may be desired at a greater distance, requiring a lens of long focal length. In order to meet all projection conditions, a set of lenses of different focal lengths is recommended.

Figure 3 illustrates the relationship between lens size, the width of image, and

projection distance [length of "throw"]. From this chart, if one factor is known, either or both of the others are readily obtainable.

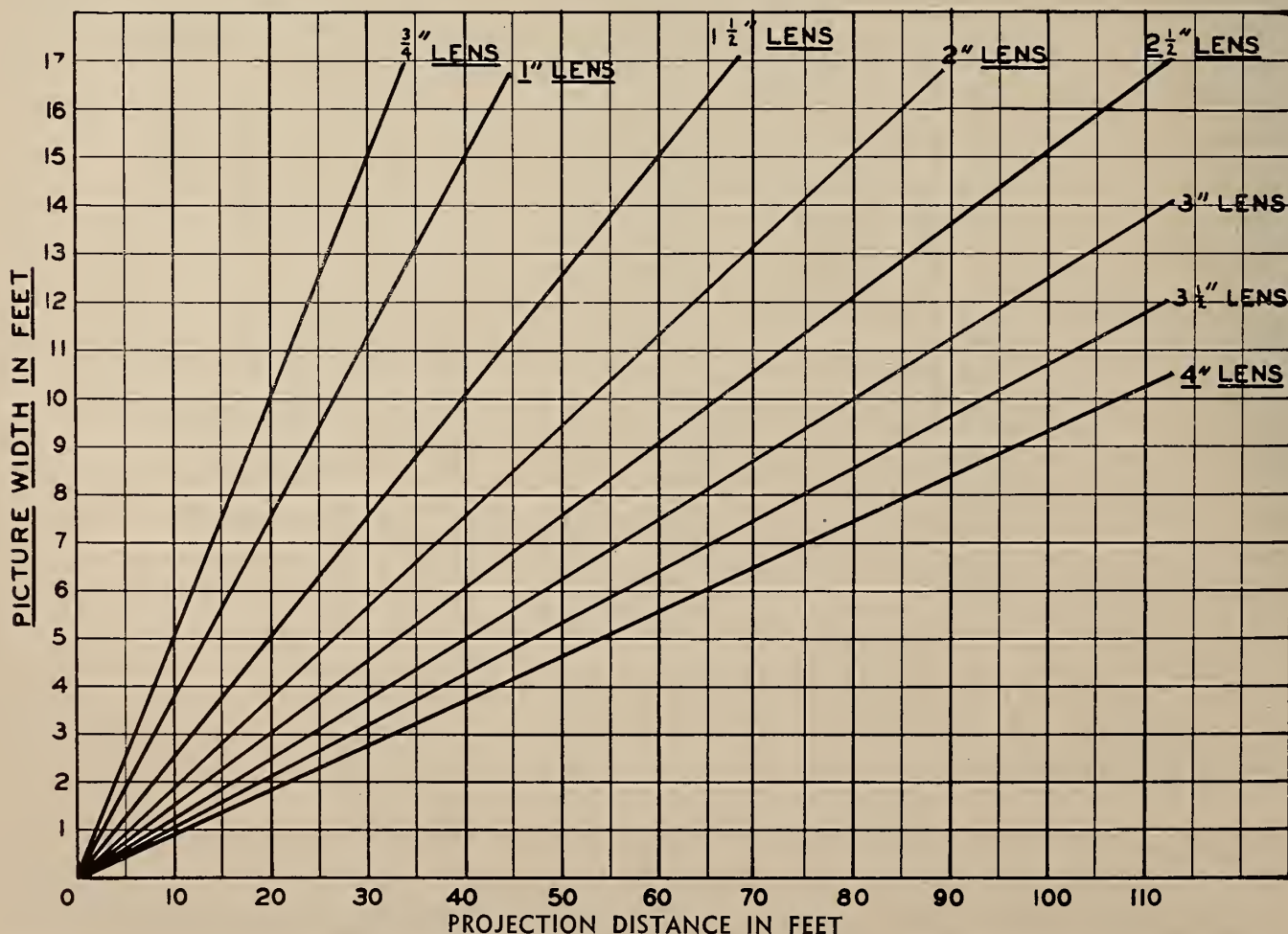
The acoustical characteristics of the room in which the sound film projector is used have a direct bearing on sound performance. As a rule, the auditorium acoustically designed for speech and music does not present as great a problem as rooms not planned for the presentation of speakers, vocalists, and instrumentalists.

The average room, for example, either embodies little or no acoustical treatment, or, when sound absorption is provided, may be so overtreated that an extreme "dead" effect results. Either condition is unsatisfactory.

In the average room not designed for projection purposes, it should be remembered that the audience itself and the window drapes may provide all the sound absorption that is needed. If additional absorbers are contemplated for wall or ceiling, the recommendations of the projector manufacturer or a competent acoustical engineer should be followed.

In the large room not acoustically designed for the presentation of speech or
(Continued on page 30)

FIG. 3. 16-MM PROJECTION LENS CHART



Builders OF THE Theatre

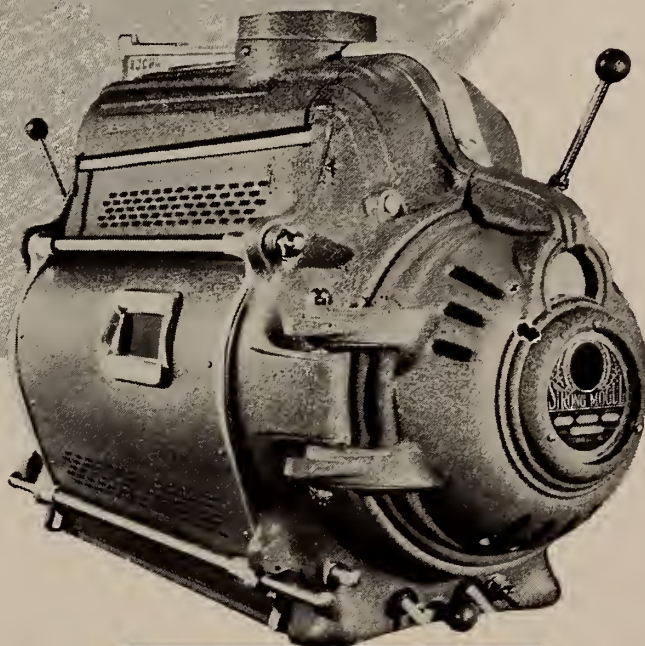


WILLIAM SHAKESPEARE

Greatest writer and dramatist of all time, he devoted his life to the theatre. No other writer's plays have been produced so many times in so many countries.

Born April 23, 1564 at Stratford-on-Avon, England, he became interested in the theatre as a boy, was a recognized actor and playwright when 28 years old. He was associated with a permanent repertory company under the patronage of Lord Strane, and the Earl of Pembroke's players, and from 1594 to the end of his career was one of the leaders in the Lord Chamberlains Company, the most prosperous theatrical troupe in London.

Shakespeare retired a substantially rich man. He died in 1616 and was buried at Holy Trinity, the parish church in Stratford-on-Avon.



THE STRONG MOGUL

A 70 ampere, 40 volt projection arc lamp which is ideal for drive-ins and large theatres. Projects 15,000 lumens—the maximum that film will accept without damage—providing a brilliant picture on 48-foot and larger screens with all details clearly visible 500 feet or more from the screen. It is wasteful, as well as futile, to burn more than 70 amperes in any reflector lamp, or twice the current in condenser lamps.

*When the lamps are **STRONG** the picture is bright!*

As the **ONLY** projection arc lamps manufactured complete within one factory, Strong lamps can be so engineered as to **GUARANTEE** the best screen results.

THE STRONG ELECTRIC CORP.

87 CITY PARK AVE., TOLEDO 2, OHIO

PROJECTION ARC LAMPS • RECTIFIERS • REFLECTORS

*The World's Largest Manufacturer
of Projection Arc Lamps*

USE THIS COUPON FOR A FREE DEMONSTRATION OR LITERATURE.

THE STRONG ELECTRIC CORP.

87 City Park Ave., Toledo 2, Ohio

- ☐ I would like to have a demonstration of the Mogul Projection Arc Lamp in my theatre, without cost or obligation.
- ☐ Please send free literature on the Mogul Projection Arc Lamp.

NAME
THEATRE
STREET
CITY AND STATE

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

ONE of the best shows of our time is the economy drive instituted by the major motion picture companies about every five years. The stage managers for such drives are, of course, the top "brass" in each company; the casualties (need we say?) are the little people in little jobs—charwomen, porters, ushers, stenographers, publicists, clerks and the like. The current economy drive, launched about six months ago, follows faithfully the pattern of its numerous predecessors.

It is almost unnecessary to report that the inflated pickings of overrated stars, producers, directors, writers, musical directors and all other members of that vast horde of "artistic" personalities were shaved by not so much as a sliver. Nor was one dollar lost to those "relatives" who infest the industry; after all, the "family" must be preserved. The little people took it on the chin, as usual; and organized labor would have taken it on the chin if the "brass" dared.

The job having been done at the expense of workers who actually did an honest day's work, what do you suppose happened next? Why, the "brass" walked into the meetings of their respective boards of directors—and proceeded to *vote themselves increases!*

Lest one suspect that these increases reflect "hardship" cases or have even a remote connection with the soaring cost of living, witness the following listing of increases granted and, where known, the new annual salary scales:

LOEW'S, INC. (M-G-M)

Name	Increase	New Salary
C. C. Moskowitz	\$28,000	\$156,428
Howard Dietz	22,500	104,285
L. K. Sidney	52,000	—
Marvin Schenck	22,000	104,285
Joe Vogel	40,000	156,428
Leo Friedman	20,000	130,357

WARNER BROTHERS

Ben Kalmenson	\$15,100	\$112,700
M. Blumenstock	6,590	49,200
R. W. Perkins	12,550	87,300
S. Schneider	4,050	91,700
Harry Kalmine	5,365	112,700

It may be noted in passing that C. C. Moskowitz, who received a tidy increase

of \$28,000, directed the Loew's "economy" drive and at that company's recent stockholders' meeting did most of the crowing over the cuts effected.

It remained for Samuel Goldwyn, noted independent producer, to expose these Loew's-Warner executive shennanigans in their true colors. Goldwyn announced a 50% slash in all executive salaries, including his own, the while emphasizing that *his employees in the low-income brackets might feel secure against any curtailment of their wages.*

"Any such readjustment must start from the top . . . and I do not believe in cutting salaries or wages in the lower brackets," Goldwyn explained. He added that if the high salaries paid to a great many people in Hollywood are maintained, producers will be forced to reduce other production values.

The Goldwyn statement closed with a thinly-veiled blast at other company toppers to the effect that he was convinced that "those who have benefited most from this business will realize the necessity for this action."

Projectionists and all other members of the organized crafts might well keep the foregoing in mind when the hirelings of these brass hats agitate for the maintenance of present wage levels or, possibly, have the gall to suggest lower scales or reduced manpower for the "good of the industry."

• Members of Local 171, Pittsburgh, Penna. generously responded to an appeal by their officials for volunteers to donate their services in the showing of motion pictures to the bedridden veterans at Aspinwall Hospital. In cooperation with the Variety Club and the American Legion, Local 171 is furnishing movie entertainment twice weekly to the hospital patients. A salute to the Local officials for their splendid efforts in this direction:

• The semi-annual meeting of the General Executive Board will be held at the William Penn Hotel, Pittsburgh, Penna., beginning Monday, March 1 and continuing throughout the week. President Richard F. Walsh will preside at the sessions.

Paul Ferry, pres.; Luther Thompson, vice-pres.; Paul Mach, sec., and Bill Thompson, bus. rep.

• Our favorite eating spot is a delightful tavern situated in the heart of White Plains, about a half hour's run from Times Square, New York City, which is operated by Dick Hayes, former business agent of Westchester Local 650. Good food reasonably priced, excellent service, and attractive decorations have made Dick Hayes' Place (as it is called) a must with I. A. men visiting this town.

• Gene Atkinson, dynamic business manager for Chicago Local 110, is still making history for one of the most progressive Local Unions in the I. A. That the members are aware of and appreciate their forceful leader was attested to in the recent Local election when Atkinson and his entire slate of incumbent officers were reelected to office without any opposition. All officers were reelected for another two-year term, with the exception of Gene, whose term of office was extended to five years.

The rapid strides forward made by Local 110 under the management of Atkinson is a never-ending source of amazement to this department. His fearless and commanding championship of his members' welfare has made the Local one of the most respected in the Alliance.

• Film Post No. 1292 of the American Legion (members of New York Local 306) will hold its second annual dinner and dance at the Carnival Night Club in New York City on April 18 next. The Post recently installed its newly elected officers: Harry Waks, commander; Frank Miller, 1st vice-comm.; Tony Rugino, 2nd vice-comm.; Sam Wittenberg, 3rd vice-comm.; Harold Salkey, adjutant; Edgar Heidelberg, finance officer; Anthony De-Floria, chaplain; James Quinn, sgt.-at-arms; Sam Salvino, Al Ashkinos, county del.; David Quinn, Americanism; Archie Hollander, hospitalization; Morton Robbins, historian.

• Vic Manhardt's new RCA supply house in Milwaukee, Wisc., was the scene of a demonstration and party given for the members of Milwaukee Local 164 and

the nearby Local Unions. Despite the below zero weather several hundred men attended the affair, including delegations from surrounding Locals.

A demonstration of the Brenkert (RCA) soundhead was in charge of R. A. Heacock, RCA engineer from Camden, N. J., who took the mechanism apart and explained in detail the construction of the various units. Refreshments, solid and liquid, followed the demonstration.

It was the consensus of opinion that Vic Manhardt and his office manager, Charlie Le Fevre, will be welcome additions to Milwaukee's theatre circles. They are not only very genial hosts but are most cooperative at all times.

- More news on Masonic activities in the Alliance. Lon Bennett, secretary of Local 521, Long Beach, Calif., informed us that several of his members hold office in Queens Beach Lodge No. 540: Clyde Jones, is Master of the Lodge; Max G. Miller, is Marshall, and Marvel Fairchild holds the office of Junior Warden. Another member, LeRoy A. Ward, is Past Master of the Alta Loma Lodge.

- Have you ever wondered what became of some of the industry's old-timers? We learned recently that B. A. Rolfe, a former Hollywood producer and one of the pioneers in the sound exhibition field, is now a disk jock on Station NNAC, Boston. Jack Kieley, member of New York Local 306, was his chief projectionist way back in the 1920's.

- The annual meeting of the New York State Association of Motion Picture Pro-

jectionists was held last month at the Seneca Hotel, Rochester, N. Y. Delegates from Geneva, Niagara Falls, Rochester, Utica, Syracuse, Binghamton, Corning, Batavia, and Hornel attended the one-day convention.

Representatives from the Bausch & Lomb Optical Company—Messrs. Stevens, Wright and Murray—lectured on the Coated Cinephor Lenses, its construction and care and maintenance. During the question and answer period that followed, the importance of proper lens cleaning was emphasized and certain soaps such as Dreft, Halo or Drene were recommended for this purpose. It was suggested that the lens be cleaned with a piece of cotton dipped in a solution of warm water and any of the aforementioned soaps, then carefully wiped with a piece of dry cotton.

A dinner and floor show followed the close of the one-day convention, at which all the delegates were the guests of Local 253. The party broke up in the wee hours of the morning and everybody present agreed it was one grand blowout.

- The New Kensington TMA (Theatrical Mutual Association) recently held its annual election of officers with the following results: John McCloskey, *pres.*; Walter Austin, *vice-pres.*; F. P. McCoy, *sec.*; Joseph Mickelic, *treas.*; B. F. Zamparini, *fin. sec.*; Phil Bordonaro, J. Kaduk, J. S. Milburn, *trustees*. This branch of the TMA is pretty much on the beam and has its own clubhouse where its members can relax and enjoy a bit of refreshment. We are very proud of our honorary membership in this organization.

25 Years Ago—February 1923

- John J. Barry, former president of the I. A. and one of its pioneers died. . . . Bill Canavan and Dick Green left for the West Coast to adjust certain difficulties that required attention. . . . I. A. became a stockholder in the Federation Trust Co. of N. Y., a costly venture. . . . Wardrobe attendants applied for membership in the I. A. . . . A. F. of L. appealed to its affiliates for financial assistance. . . . Brooklyn, N. Y. Local 4 applied for the revised charter of Local 340. . . . Motion was made, seconded and unanimously carried by the General Executive Board that proper steps be taken to bond theatrical promoters. Too many complaints received by General Office about irresponsible persons taking out theatrical troupes and leaving them stranded on the road. . . . Tony Boscarella, member of Local 59, Jersey City, N. J., won his appeal to the I. A. for reinstatement in his Local.

- A long record of keeping his appointments on time is probably what saved the life of Hy Berling, business agent of Local 380, Oklahoma City. Berlin Parks, secretary of the Local and projectionist at the Tower Theatre, became alarmed when Berling failed to show up for an appointment, and, after a lapse of several hours, telephoned a mutual friend who lives near the Berling home. Berling was found slumped across a chair, overcome by fumes escaping from a gas stove in his living room. When he was revived several hours later, Berling said he remembered nothing from the time he turned off the water in the kitchen sink about noon until he awoke in the hospital about 9:30 that evening.

- Felix Snow, business agent of Local 31, Kansas City, Mo., and 6th I. A. vice-president, was in charge of arrangements for the Local's annual New Year's Eve shindig, which was attended by many prominent theatrical personages. The guest of honor was Mike Cullen, district manager for Loew's Theatres, who flew in from St. Louis to attend the party.

- Settlement of the long-standing wage negotiations between Local 150, Los Angeles, and the major theatre circuits has been reached. Agreement provides for a 20-cents-per-hour increase and arbitration of all differences which threaten a work stoppage. Increase is retroactive to July 1, 1947, which means back-pay checks ranging from \$300 to \$700 for the member involved.

New scale is \$2.55 an hour in first-runs (old scale \$2.35) on a 36-hour weekly basis, with a one-hour leeway permitted each day before over-time rate of time-and-a-half becomes effective.

(Continued on page 33)

NEW YORK STATE ASSOCIATION OF MOTION PICTURE PROJECTIONISTS CONVENE

Newly elected officers of the Association at the one-day convention held recently in Rochester, N. Y. Front row, left to right: Chas. F. Wheeler (Geneva L. 108), secretary-treasurer; Earl Tuttle (Binghamton L. 396), president; William Wheeler (Niagara Falls L. 121), vice-president; John F. Short (Corning L. 480), vice-president; Allen Tindol, president of Rochester L. 253; Lou Goler, chairman of arrangements, Rochester L. 253; George Vleck, delegate, Utica L. 337.





THAT which IP has for so long warned against has finally come to pass: the motion picture industry is in *direct competition with itself*—that is, as far as the theatre field is concerned. Feverish tele developments of the past month reveal with startling clarity that video *per se* will not only be tough competition for the theatre box-office but that a branch of the film industry will contribute heavily to magnifying such competition.

For the production end of the film business, accustomed to a ponderous girth the result of feeding on theatre box-office receipts for many years, has voluntarily broken down the barrier which hitherto prevented it from playing ball with its deadly economic enemy—television.

Not that the film companies plan to withdraw from the theatre field. Oh, no. Those babies are going to have their cake and eat it too—only the eating bill will be paid for by the gradual falling off in utility of billions of dollars in real estate that are the theatres of America and in the loss of thousands of jobs in the theatre field.

Film Industry-Video Lineup

Here's the lineup for this deadly game of "To hell with you, me first, and the devil take the hindmost":

Following announcement by both the Associated Press and United Press that they would supply tele networks with *daily* film clips of important news happenings, International News Service weighed in with a similar service. INS is owned by the Hearst interests, which

also control News of the Day, newsreel long distributed by M-G-M. Score one for video.

The next shattering blast was delivered by 20 Century-Fox, which, while servicing thousands of theatres in America, had the temerity to announce that it would supply NBC tele outfits with 5 weekly news reels of 10 minutes duration. To be sponsored by Camel cigarettes. Score two for video.

Bandwagon Rush Begins

With Fox getting away with this brash maneuver, dear old Paramount moved quickly to board the gravy train. The latter announced, with equal unconcern for the welfare of its thousands of theatre accounts, that it would offer a schedule similar to Fox. There was a slight hitch, however. Exhibitor opposition? Labor protest? Naw. Paramount is assiduously looking for a sponsor. Score three for video.

Next followed Universal-International with the same type proposal. Probably also deterred from immediate activity only by lack of a sponsor. Score four for video.

Paramount compounded its audacity by announcing that it would place at the disposal of any tele sponsor its 66-second system of transferring shows from the face of a tele receiver to 35-mm film, this for the purpose of permitting shipment by plane of copies of live shows to those areas not yet served by coaxial cable or radio relay network. This service will cost 20 cents per foot of 35-mm film, plus print costs, with a minimum charge of

\$100 per assignment. Score five for video.

Score *ten thousand* for video, because nobody with a voice loud enough to carry five feet squawked against this outrageous duplicity of turning liquid fire against the very theatre structures which for years have laid the golden eggs of swollen producing company profits. Nor did the industry trade press let out a whimper in behalf of those whom it purports to serve.

Theatre, Video Reels Will 'Vary'

The film companies sprayed copious draughts of sleeping potion over these transactions by announcing that theatre newsreels and those supplied to the tele networks would "vary"—not be "different," remember, but "vary". The logical query to such nonsense is a simple "How?"

Let's assume, as an example of a top spectacular news event of the past several years, that the French liner *Normandie* was burning furiously at its pier in New York City. The theatre newsreel companies would cover, of course—but does anyone with an ounce of sense suppose that the tele newsmen could be blocked from filming the spectacle and rushing it to the video station for ethering within the hour?

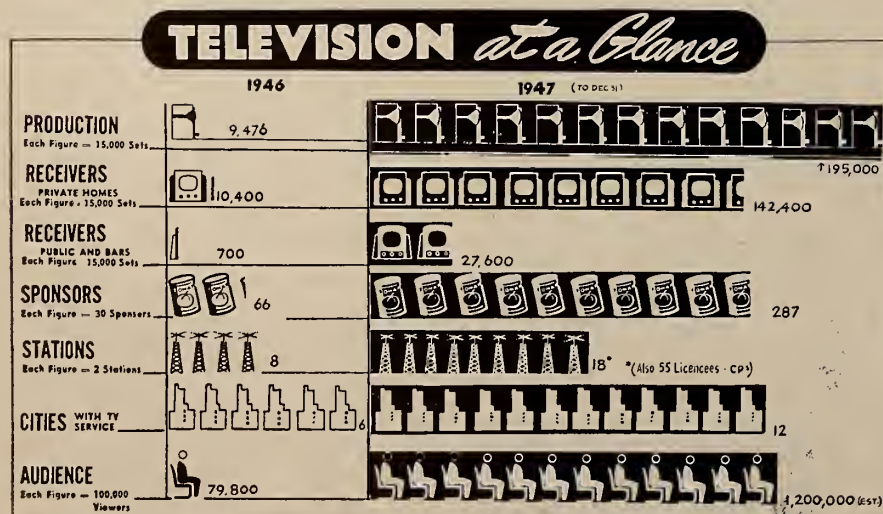
Why, under the terms of their contracts with both their sponsors and the network they'd be forced almost to employ axes to hack their way to the scene. This "vary" stuff is the old hoopla, the degree of difference between the theatre and the video newsreels being only of the extent dictated by the separation of about one foot between the lenses on the respective cameras.

Others might figuratively bury their heads beneath the bedclothes with the observation, "Oh, well, television still has a long way to go. There are only a few thousand tele receivers and only about a dozen video transmitters in action right now. Let's wait and see what develops before we leap to any conclusions".

Tele's Phenomenal Progress

Well, these super-optimists don't have to wait long nor look far for such conclusions. In fact, not beyond the borders of this very page. Just take a gander at the chart showing the comparative growth of the video industry in the space of a *single year*. And within less than another year—the end of 1948—there will be 50 tele stations broadcasting and between 750,000 and 1 million tele re-

Phenomenal growth of all aspects of television as charted by "Televisor" magazine. Outlook for 1948 is even more promising.



ceivers operating. (Data source: David Sarnoff, president of RCA.)

And development of the tele art need not be retarded for lack of coaxial cable or any of that direct-hookup hookum. Take a look at another illustration herein and see how easily Bell Laboratories accomplishes its radio relay hop from New York to Boston.

Video is Show Business

Show business people are all to prone to forget the most important aspect of the rapidly growing video industry. This fact is that tele *is* show business, *is* entertainment, and that in the last analysis there remain only so many millions of potential audience to be entertained only so many hours daily.

In support of this statement take a look at still another illustration herein, a reproduction of an ad that ran in large space in all New York City dailies (and elsewhere, for all we know). Entertainment? Positively. Newsworthy? Positively. Speedy? Positively, because the films were flown over the Atlantic and broadcast "only hours after the actual event". Just imagine: *every night for eight consecutive nights*. And sponsored, too, which means that the all-important dough-re-mi angle was covered.

Competitive Angle Acute

IP is weary to the point of exhaustion of expounding the idea that if Joe Doakes enjoys good tele reception in the comfort of his home, there is no logical reason why he should divest himself of his robe, his slippers and his pipe and stretch a shoelace to hie himself, probably in unfavorable weather, down to the

Greatly reduced reproduction of large-space ad appearing in all N. Y. City newspapers, stressing speedy presentation of outstanding topical event.

TELEVISION - TONIGHT!

and every night for 8 days

THE 1948 OLYMPIC WINTER GAMES FROM ST. MORITZ SWITZERLAND



From far-off St. Moritz, where the Olympic Winter Games are even now being held, come the spectacular on-the-spot film recordings of the world's greatest winter-sports figures in breath-taking action only hours after the actual events take place! Don't miss this unprecedented coverage of the games, brought to you every evening from February 1 to February 10.



TUNE IN TELEVISION

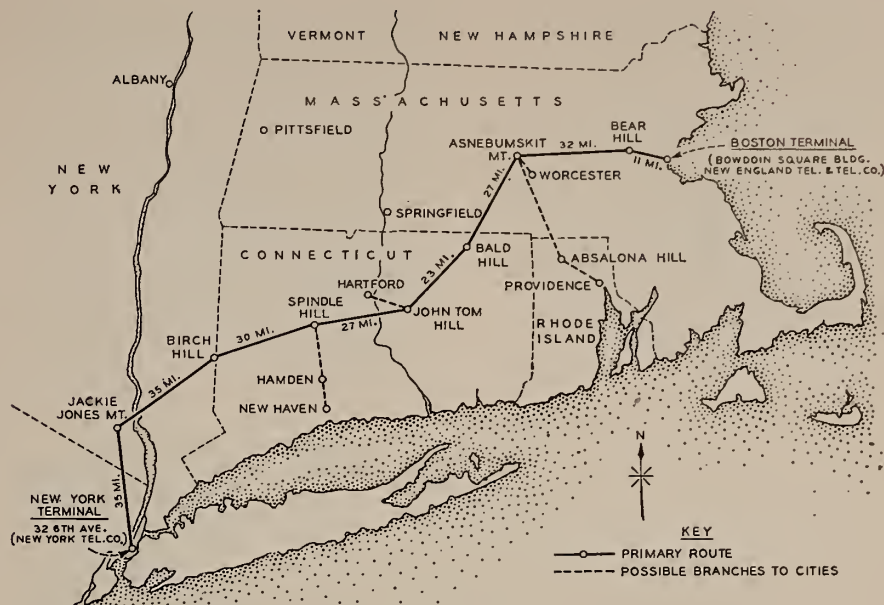
9:00 P.M., FEB. 3RD

(WABD) 5 (76-82 M.C.)

(NEW YORK)

(Subject to Trans-Atlantic Flying Conditions)

FLOWN DIRECT TO YOU FROM EUROPE AND
PRESENTED BY YOUR LOCAL
CHEVROLET DEALERS



Graphical outline of Bell Telephone Labs' radio-relay hookup between N. Y. City and Boston. Hookups similar to this populous area's are possible virtually throughout the U. S.

Gem Theatre on the corner.

"Gregariousness," the elemental urge of all humans to congregate with their fellow men? Why, haven't you read those compelling advertisements of the tele promoters bragging about how you can have as many as 20 of your friends in to witness the video shows? Sure you have.

IP will go along with those who sigh resignedly and mumble something to the effect that "you can't stop progress". They're right. But IP readers have a right to be kept informed of those developments in the industry which vitally affect their security and, most important in this situation, *how* it is being brought about.

QUITE a splash is being occasioned by Colonial Television Corp. (licensee of RCA), of New York City, which announces that it has arranged for experimental showings of its "large screen," receiver-projector theatre television equipment in 23 houses in four major centers—6 in New York, 5 in Los Angeles, 4 in Chicago, and 8 in Cleveland. Various other major theatre executives have been huddling with Colonial, but nothing definite as yet.

Colonial utilizes a set similar to the RCA Model 630 receiver with a voltage tube stepped up to 30,000 volts by booster transformers. Mounted in front of this tube is a 5-inch, 2-element, *f*: 1.9 Bausch & Lomb projection lens.

The equipment is mounted on wheels, with "complete portability" claimed. Reputedly able to project a 9x12-foot image, observers for IP have never seen it deliver larger than an 8x10-foot picture. The unit is listed at \$2195, plus \$150 installation charge.

[NOTE: Coincident with its drive for theatre business, Colonial, either on its

own or cooperatively, took thousands of lines of display advertising space in New York City newspapers to ballyhoo the same set for home use. Set mobility is stressed and Mr. Average Man could easily gain the impression that the set could be moved about at will without regard for power or video antenna connections.]

Here is the report from IP's operative on the West Coast relative to theatre television activities in that sector:

West Coast Theatre Tele

"On New Year's day KTLA broadcast the USC-Michigan Rose Bowl football game. That same evening the Pickfair Theatre showed the game to its patrons via reproduction from 16-mm film.

"A television set (RCA Model 630) was set up in a local commercial 16-mm lab, and the picture was photographed from the tube. The sound was taken directly from the receiver. The film used was reversal stock, processed in the lab and sent to the theatre by motorcycle messenger. Projection was by a 16-mm arc job from the regular projection room. The time lag—filming to hitting the sheet—was about 45 minutes.

"This same process was demonstrated for the ITOA at the Pickfair on January 21. Quality was very poor, due to the purely experimental nature of the show. The 521-line, 30-frame per second tele scanning was out of sync with the 24-frame/p.s. camera. This naturally caused a shutter flicker which, while not too objectionable, left plenty to be desired ala quality.

"On January 28 a similar showing was staged for the same group. Opener was a portion of the KTLA "Your Town" program. The Colonial equipment was used, supplied by local agents. Trouble was experienced with the receiver, but after 15 minutes they hit the sheet, which was a

(Continued on page 32)

CARBON ARC GASES

(Continued from page 11)

outpouring of fluid into the alveolar spaces. This fluid is practically the consistency of blood plasma.

The chronically exposed animals showed various findings in regard to pathological physiology consistent with chronic inflammatory disease of the respiratory tract and resultant loss of appetite and starvation.

The results of these studies and similar reports indicate the need for considering the conditions under which electric arcs are operated. There is no basis for criticism of those operating conditions in which there is an exhaust flue in which forced ventilation is in use to remove the products of combustion, no matter what the conditions of use are. However, there is danger in inhaling fumes coming from an improperly ventilated arc.

U. S. Labor Dept. Survey

The *Monthly Labor Review* published³ a summary of a survey of the safety standards for motion picture projectionists in 186 cities in the United States having a population of 50,000 or over. 104 of the cities had no laws as to the number of size of ventilation inlets of projection rooms; 95% of the cities had some requirement that systems should be vented to the outer air, but only 19 had definite specification as to area or diameter of vents in relation to room size, number of lamps, or number of men working.

The survey showed that detailed requirements as to equipment to be used and methods of ventilating the projection room proper and the lamphouse are not general. The cities of Hartford, St. Louis, and Philadelphia, as well as the states of Indiana and New York are the only ones that have definite requirements in regard to the system of lamphouse ventilation.

In Hartford the 1936 law states that the booth air must be changed at the rate of 30 cu. ft./min. The arc lamp housings must be vented to the outside air and must be provided with automatic shutters.

Direct Ventilation Ideal

The St. Louis Law adopted in 1937 states that "each lamphouse where carbons are used shall have an independent forced ventilation system of sufficient size to carry off, independently of the booth ventilation, all fumes, carbon dust, and carbon monoxide gas generated in the lamphouses while in operation."

In Philadelphia a complete system of direct lamphouse ventilation is required. The system must consist of a motor-operated fan which is connected in the

lighting circuit so that it will switch on and off with the room lights. The flue must be able to draw not less than 200 cu. ft./min. per lamp.

On spot lights or other projection equipment where the lamphouse must be free to move, the exhaust duct is required to terminate in a hood above the machine, and the flue leading from the hood must discharge out-of-doors. Both the lamphouse exhaust fan and the general room exhaust fan are required to have separate sheet metal discharge ducts to outside air.

In Indiana the State law requires that all arc lamp housings must be connected to the general room ventilation system.

New York State requires that the arc lamphouse be provided with a chimney and damper which shall carry off the products of combustion in the arc housing to the outside atmosphere.

The ventilation system should be a forced one and the fan should be so wired that when the arc is struck the fan turns on automatically.

General Conclusions Reached

It may be concluded from these experimental studies that:

1. There are gaseous and particulate products of arc combustion. The oxides of nitrogen are the main toxic gaseous substances present. The ash is approximately 65 to 70% rare earth substances, especially insoluble cerium oxides and fluorides.

2. The concentration of the oxides of nitrogen in the exhaust flue of a projection arc is within the range of toxicity if the undiluted fumes are inhaled.

3. Inhalation of the gross and filtered arc fumes, occurring in concentration ranges as exist in the arc exhaust flues, causes the death of common laboratory animals exposed acutely and chronically. Acute exposure results in a methemoglobinemia and lung edema, and chronic exposure results in a pneumonitis, showing patchy atelectasis and chronic inflammatory changes in the respiratory tract.

4. The main conclusions that may be drawn from the various studies of this topic are that each projector lamp should be connected to a flue in which the fumes from arc combustion are exhausted by means of a motor-driven fan to the out-of-doors. The fan should turn on automatically as the arc is struck and the exhaust should draw from 12 to 100 cu. ft./min. In general it may be said that if ventilation is adequate to give a comfortable working temperature in the projection room, there is no danger of the toxic gases produced by the electric arc reaching disagreeable concentrations.

[Ed.'s NOTE: Immediately following are the recommendations of the Projection Practice Committee of the Society of Motion Picture Engineers relative to both minimum and ideal standards of projection room ventilation.]

Does Your Projection Room Conform?

Approved Projection Room Ventilation

AS FORMULATED BY THE PROJECTION PRACTICE COMMITTEE OF THE SMP E

THE projection room proper shall have the following ventilating facilities: (a) Carbon arc exhaust (b) Fresh air supply, and (c) Projection room exhaust, including an emergency exhaust.

The carbon arc exhaust system shall be a positive mechanical exhaust system independent of all other ventilating systems of the theatre. Each projector, spotlight, stereopticon, or floodlight machine, if of

the carbon arc type, shall be connected by a flue to a common duct, which duct shall lead directly out-of-doors.

Reduction of the ventilation to each projector as required shall be accomplished by means of a local damper between the projector lamphouse and the projection room ceiling, and in addition, by means of the damper on the lamphouse

(Continued on page 33)

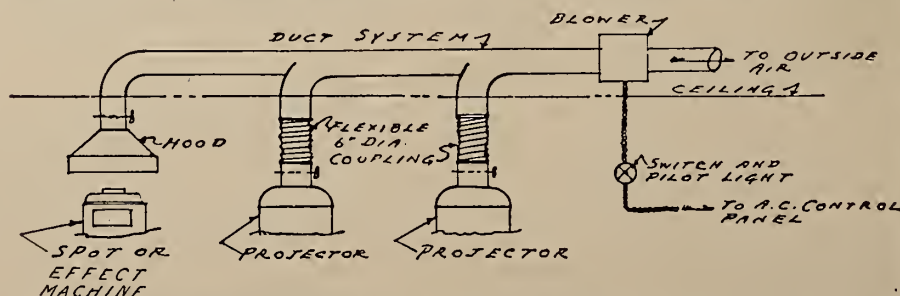


FIG. 1. Equipment ventilation system: blower capacity 400 cu. ft. per min.; minimum air movement through lamphouses with blower idle: 15 cu. ft. per min.

³ Bureau of Labor Statistics, U. S. Dept. of Labor. Safety Standards for Motion-Picture-Machine Operators. *Month. Labor Rev.*, Jan., 1938. Serial No. R-647. U. S. Government Printing Office, Washington, D. C.

IPC Hosts 25/30 Club

INTERNATIONAL Projector Corp. did itself right proud of a recent wintry evening when it hosted more than 150 members of the famed 25/30 Club at its new and ultra-modern plant in Bloomfield, New Jersey. The evening was designated as Walter E. Green Night in tribute to the president of National Theatre Supply Co., himself an honorary member of the Club.

The guests were welcomed by Mr. Green who, in discussing the many mutual problems which confront the manufacturer-distributor and projectionists, stressed the spirit of friendship and close cooperation which IPC and its affiliated companies have always exhibited toward the theatre crafts.

The occasion marked the installation of the newly elected officers of the Club, following which ceremonies the group was conducted on an inspection tour of the plant under the direction of John Campbell, plant superintendent. Mr. Campbell's exposition of the many intricate steps involved in producing high-quality sound-projection equipment sustained his reputation as a fine craftsman and merited the keen appreciation displayed by his audience.

Next came the tying-on of feedbags, with the refreshments lacking neither quality nor variety. The gathering lasted until far into the early morning hours, being voted one of the most memorable of a long series of notable meetings held by the Club.

Noteworthy was the attendance of three former and the present president of Local 306, N. Y. City, namely, Bob Goldblatt, Harry Mackler, Harry Sherman, and Herman Gelber. Congratulatory messages were received from, among others, Gene Atkinson, business manager



Morris Rotker, president 25/30 Club.



Mike Berkowitz, past president.



Morris J. Rotker (5th from left), 25/30 Club president, surrounded by a group of his members, left to right: Wm. Salke, Herman Higgins, Mike Berkowitz (past president), Bert Sanford (Altec), Rotker, Morris Klapholz, Cecil R. Wood, Sr., Ben Stern, Al Kaye (L. 384, N. J.), and Dave Narcey.



Representing IPC, left to right: Ernest Berg, plant superintendent; Arthur E. Meyer, sales manager; John F. Campbell, vice-president in charge of production; Walter E. Green, president, NTS; Ed Worfolk, comptroller; Will Borger, engineer; Frank P. Goldbach, chief engineer; Charles Schmid, foreman, assembly dept.; Chris Alexander, assistant chief inspector; Henry F. Heidegger, chief inspector; Joseph Kuenzig, foreman, tool room.

of Chicago Local 110; Herb Griffin, former IPC sales manager; Charlie Vencil, secretary of Los Angeles Local 150.

and P. A. McGuire, whose years of work in the projection vineyard render superfluous any identification here.

Posing for IP's cameraman are, left to right: Bert Sanford, Altec Service; Harry Sherman, IP; Walter Green, National Theatre Supply; Cecil Wood, Sr., Morris Rotker, and Mike Berkowitz, 25/30 Club.

Henry Heidegger (second from right), chief inspector for IPC, explains to the 25/30 Club visitors one of the many intricate steps involved in producing the company's high quality sound projection equipment.



German Research Program on Carbon Arc

Detailed in Report by OTS

NEW developments in the most brilliant man-made light source known, the high-current carbon arc, are described in a technical research report now on sale by the Office of Technical Services, U. S. Department of Commerce. The comprehensive 226-page report, which was prepared for OTS by Dr. Wolfgang Finkelburg, a German scientific consultant, also contains a review of original research and development work carried out by the author.

The new form of carbon arc discharge is so far above the currently obtained arc from carbon electrodes, that of necessity the present form should be referred to as a "low-current arc" to distinguish between them, the author states.

The report deals with present knowledge of the high-current carbon arc—and especially its most important modification, the Beck arc—so as to provide a basis for future research, development and application of the high-current carbon arc. All research information, both published and unpublished, from Dr. Finkelburg's laboratory as well as from all other physical and technical laboratories known to the author, are contained in the report.

The Beck Arc of 1912

The Beck arc dates back to 1912 when Heinrich Beck of Meiningen, Germany, in studying the problem of attaining the highest intrinsic brilliancy, found that a cored carbon anode containing metal compounds, such as fluorides of the rare earths, could stand several times the normal current density. An arc formed by the use of a solid carbon anode begins hissing and cannot be used as a light source with current higher than 40 amperes per square centimeter.

The Beck cored carbon anode, when overcharged, forms a deep positive crater in front of which appears a "flame" of brilliant light-emitting vapors. Because of its characteristic form it is called "anode-flame," "Beck-flame" or "tail-flame." The intrinsic brilliancy of the positive crater thus formed can be increased up to five times that of the low-current carbon arc, allowing many-sided technical applications.

The author believes it strange that even though much development work based on the Beck arc has been undertaken both in the United States and in Europe, the question of the processes occurring in the arc discharge was not asked and the problem never attacked systematically.

"This seems the more astonishing," he

writes, "as the fact that the Beck arc voltage going up with increasing current instead of going down (like that of all other known carbon arcs) was evidence of some quite peculiar physical mechanism." Other peculiar characteristics of the Beck arc, never before investigated, prompted him to undertake a careful study of the discharge in 1938.

Comprehensive Studies Cited

The OTS report is a summation of Dr. Finkelburg's study and contains explanations of various theories advanced by the author together with corresponding mathematical analyses. Dr. Finkelburg measured the angle of distribution of light radiation with lightmeters and the "black" temperature of the arc crater with pyrometers.

He explored the dependence of the

Altec Projection 'Whiteboard'



Cecil Wood, Sr., member of New York Local 306, and Elmer O. Wilschke, Altec Service operating manager, inspecting the first installation of Altec's "whiteboard," or "white blackboard," in the Warner Theatre, N. Y. City. This board, measuring 12 by 18 inches, is a panel of smooth-surfaced Masonite which, written upon with a special black crayon, is instantly erasable by passing an ordinary cloth across it.

Intended primarily for projection room use, this board is mounted permanently at a convenient place in the room to serve as a handy means of communication between projectionists, for memos, and for notations for the serviceman from off-shift crewmen. Space is provided for pasting onto the board an imprint bearing the name of the Altec serviceman, his phone numbers, and the district service office.

The board is definitely not for sale and will be distributed gratis to the 6000-odd theatres in the U. S. who subscribe for Altec service.

light efficiency on amperage and crater brilliancy, the energy distribution of the radiation, and the rate of consumption of the carbons used; and also measured the high-current carbon arc in pure gases and at higher and reduced pressures.

When Dr. Finkelburg operated the Beck arc in argon gas at high voltage, he states, the flame did not appear at all, and only in a reduced form when a 6-mm positive carbon was used at 100 amperes.

"We think," he writes, "that this rather surprising behavior of the arc in argon is caused by the metastable energy states of the argon atom. Because of the high temperature of the arc stream, we have there a rather high concentration of metastable atoms, which, being electrically neutral, are able to diffuse also into the anode drop region."

Dr. Finkelburg considers this explanation of the action of the arc in argon a direct confirmation of various theoretical considerations of the mechanism of the high-current arc discussed in the report.

Summary of Characteristics

A summary of the properties of both types of arcs is presented. Voltage characteristics, methods of measuring electrical properties, and an explanation of the "Beck Effect" are described. The report presents a "similarity law" for arcs of different diameters and details the influence of carbon position and arc length on light-emission characteristics. The anode drop and potential distribution in the arc are described.

A table presents the results of measurements of five d.c. Beck arcs made by the author and two other researchers. Additional tables in the report summarize ultraviolet radiation intensity of both types of arcs and values of arc gradients.

The report contains 129 illustrations, chiefly photographs of the arc flame, equipment using carbon arcs, and graphs presenting data on radiation density, crater brilliancy, and light efficiency. An appendix contains a bibliography listing 90 references.

Mimeographed copies of the report (PB-81644: "The High-Current Carbon Arc," 226 pages, tables, photos, diagrams) sell for \$5.75 each. Orders should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Huge Demand for Kodak Book

Because of an overwhelming demand for the book "How to Make Good Movies," deliveries of additional copies to dealers will be delayed until sometime in March, announces Eastman Kodak Co., publishers of the volume. This despite a redoubled print order for this 9th edition.

NITROCELLULOSE FILM

(Continued from page 6)

monia, sulfur dioxide, and hydrogen sulfide, all of them active poisons.

It was stated previously that the camphor content of celluloid prevents actual explosion of the solid. The camphor also renders celluloid somewhat less violently combustible than pyroxylin, its chief constituent. Now, *old film has lost some of its camphor*, thus it is more brittle and more dangerously inflammable than new film.

The picture image itself, because of its selective absorption of radiation, has an appreciable effect upon the combustibility of film. A dark, or "dense," print absorbs heat more readily than a light, or "thin," print. The application of heat therefore ignites a dark film more easily, but after the combustion has started there is little difference in the way the two types of film burn.

It happens occasionally that a film breaks between the intermittent sprocket and the aperture, allowing the intense light beam to strike motionless film. Very seldom, however, does an accident of this sort result in widespread film fire. The frame at the aperture is at once burned out, of course, but the comparatively cool gate conducts heat away so rapidly that the rest of the film never attains its ignition temperature.

Chief Causes of Film Fires

The experienced projectionist knows the value of precaution in the matter of film fires, but in the majority of theatres the entire burden of film fire prevention falls upon him alone. And where incompetent "hacks" are in charge, the burden is not well borne. The average theatre owner flagrantly ignores the prime sources of danger, i.e., antiquated and worn projection equipment manned by "hacks" instead of by skilled projection specialists.

Here is a list of causes of film fires for which the exhibitor is responsible. Defective equipment naturally heads the list, for more than 90% of all film fires may be attributed to this cause:

1. Defective and worn projection equipment.
2. Placement of spark-emitting motors or switches near the rewinder.
3. Torn, brittle, or worn film.
4. The use of a high-amperage arc with a front shutter projector, causing dangerous overheating of the gate.
5. Faulty operation of the automatic fire shutter.

Now follows a list of hazardous practices (in no special order) not uncommon in "hack" projection. Since it lies in the exhibitor's power to hire competent projectionists, can he not be con-

sidered responsible also for these causes of fire?

1. Allowing dirt to collect and jam fire-valve rollers and other projector parts.
2. The use of matches to probe dirt from a loaded projector.
3. Incorrect or careless threading of projectors.
4. Bringing film in contact with hot parts of projector when threading.
5. Failure to close the dowsers after a shutdown.
6. Failure to close the magazine doors.
7. Dropping hot carbon stubs onto film.
8. Throwing carbon stubs into the film waste can.
9. Smoking in the projection room.
10. Permitting film to come in contact with unshielded radiators or heaters.
11. Hasty and careless repair of prints.
12. Laying a hot soldering iron on the rewind bench or near the film cabinets.

The projectionist should ponder this list to make doubly certain that he follows none of these dangerous practices.

The danger of fire can be greatly mini-

mized by retraining from unwinding film on the floor. If a projector takeup fails (but why should it?) the projectionist should never allow the film to feed out all over the projection room floor. Loose film burns hundreds of times more fiercely than a compact roll, and, too, scattered film offers an alarming opportunity for chance ignition.

Despite every precaution, accidents *do* happen. It is almost impossible to give specific advice here except on one point: *Do not attempt fighting a film fire with inadequate equipment.* Shut off the lamps and motors if you have time, rip the port-slide release, and **GET OUT OF THE PROJECTION ROOM!**

Carbon-Tet Extinguishers Vetoed

A film fire can be put out only by cooling the film below its ignition temperature. Ordinary fires can be extinguished by blanketing the blaze with an oxygen-excluding gas such as carbon tetrachloride vapor, but this is not true of burning film. *Film contains its own oxygen.* A carbon-tet extinguisher may or may not put out a film fire, depending upon the intensity of the blaze. A hot fire will immediately convert the car-

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The Altec Lansing A-2 and A-2X "Voice of the Theatre" speaker systems are for use with amplifier power up to 80 watts and up to 150 watts respectively. These systems make 100 percent use of the complete frequency range as recorded

on the sound track. Ask your supply dealer about the right size "Voice of the Theatre" for your theatre. "Voice of the Theatre" sound systems are supplied as regular equipment by most leading manufacturers of theatre systems.



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New York 19, N. Y.

bon-tet to gas, thus robbing it of any cooling effect it might have.

In addition to its inefficacy, the nature of vaporized carbon-tet renders this type of extinguisher extremely hazardous to the projectionist. The fumes of carbon-tet are injurious when inhaled (more poisonous than chloroform) and, what is worse, they react with the inevitably present water vapor of the air in contact with hot iron or iron oxides to form lethal *phosgene*. (Phosgene, the chemical name for which is carbonyl chloride, is a poison gas of warfare.)

The soda-acid type of extinguisher, while effective, ruins equipment and may

short-circuit electric wiring. The same is true in a lesser degree of water.

The most effective and least deleterious extinguisher for film fires is carbon dioxide in the form of a compressed liquid which when released spontaneously freezes to a snow of "dry ice". The temperature of the snow is about 110 degrees below 0° F., cold enough to extinguish the most violent film fire. Moreover, the solid evaporates directly to a harmless gas without first passing through a messy liquid state.

Why do not more municipal and state fire boards require the installation of carbon dioxide extinguishers in projec-

tion rooms? Exhibitor opposition? Not unlikely, as this type of extinguisher is more expensive than others.

But even in the total absence of fire-fighting equipment, there is ordinarily no reason for a projectionist to suffer physical harm as a result of an accidental projection room fire. If the film ignites, he may have about 15 seconds in which to shut down operations, *calmly and according to a predetermined plan*, and get out of the projection room.

Projectionist's Responsibility

[EDITOR'S NOTE: In line with IP's policy of permitting the fullest freedom of expression to all contributors, the foregoing article by Mr. Mitchell has not been edited so as to change in even a minor way the sense of the presentation. IP does feel, however, that, despite the efficacy of any unit of fire-fighting equipment, the projectionist should never undertake to fight any film fire.

While Mr. Mitchell mentions the availability of carbon dioxide extinguishers merely in passing, IP is impelled to reiterate its opinion that the projectionist has fully discharged his obligation to his employer and to the audience where he pulls the lamp switch, kills the projector motor (if possible), switches on the house lights, and releases the port shutters. The latter control should be near the door in any modern projection room.]

RCA Theatre Service Division Observes 20th Anniversary

RCA Service Co. is currently celebrating its 20th anniversary in the theatre field, the first such call having been made at the Majestic Theatre, Johnstown, Pa., in 1928. Today the company employs more than 200 field engineers who, in close contact with RCA supply dealers throughout the country, install equipment, render periodic and emergency service, and arrange for theatre surveys.

Significant milestones in the progress of the company were the introduction in 1931 of the first a.c.-operated equipment, thus eliminating motor generators and bothersome storage batteries; in 1934, a low-cost replacement parts plan for sound systems, followed later by a similar plan for projection parts; the buzz-track method for alignment of sound recording and reproducing units, and the RCA Triatic Signal Tracer for quick detection of trouble in sound equipments.

Publications of the Theatre Service Division as a direct aid to the theatre field included a Handbook for Projectionists and a Television Handbook for Projectionists.

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**SERVICE
MANUAL**

AMERICAN TRADE UNIONS

(Continued from page 8)

political policy. They wished, in substance, to convert the Federation into a stronghold for socialism in America.

There were other elements at work to force a change in the Federation's basic policies. Labor in many industries was dissatisfied with its terms of employment and conditions of labor. There was ample justification for workers' resentment toward many employers and toward the obvious assistance given anti-union businessmen by the authorities, the legislatures and the courts.

Some groups were not in accord with the rather rigid craft character of some of the strongest of the internationals. They also objected to the strict discipline maintained by the crafts over their members and their sturdy, unyielding application of collective bargaining with employers instead of more radical methods. To them it seemed that the Federation's program tended to hold them in check, to dampen and restrain the workmen's spirit, instead of to inspire them.

Socialists Seek Control

The leaders of these dissatisfied and impatient groups inside and outside of the Federation were determined that American labor should have what they thought would be a more vigorous purpose and method, or they would supply it. They believed that they were competent, and furthermore that the lamps of experience which guided the Federation were misleading lights.

In 1893 two organizations entered the field, the American Railway Union and the Western Federation of Miners.

Eugene V. Debs, an official in one of the railroad brotherhoods, became convinced that the existence of the brotherhoods permitted the railroad managers to play one against the other; furthermore, that the officers of some of the brotherhoods deliberately advanced the welfare of their members by blocking the negotiations of others with the railroad executives, receiving consideration in return which otherwise would not have been given. Whether or not this was so, many railroad workers believed it to be true.

Debs believed that all railroad employees should be members of one great national organization, so that they could present a solid, united front to all the railroad systems. He would overcome their strength with an organization which could stop operations on any or all railroad systems. He organized the American Railway Union with bright prospects of securing a goodly portion of his membership from the ranks of the brotherhoods.

Possessed of a brilliant mind, a magnetic personality and an unusual gift for self-expression upon the public plat-

form, combined with unquestioned sincerity, he succeeded in a few years in building up the American Railway Union's membership to approximately 150,000.

Pullman Strike Decisive

The organization he had founded was rapidly growing in numbers and prestige when the famous Pullman strike occurred. Debs' interest in his fellowmen, his warm-hearted idealism seemingly

influenced him in the decision he made. A more experienced, more practical-minded labor leader would have carefully examined the major factors before throwing his entire organization into a strike to assist another group of workmen also on strike against a powerful employer.

The strike proved the death blow of the American Railway Union. Debs was found guilty of federal charges lodged

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against him and was sentenced to imprisonment. While confined in prison Debs became a convert to the social and industrial philosophy of Karl Marx. Upon his release he publicly announced his intention to support socialism. Soon he was the leader of the Socialist Party. He was the party's candidate for President of the United States in many elections. To his belief in industrial unionism Debs had added his forceful advocacy of socialism—socialism which



M. B. HORWITZ—President and General Manager, Washington Theatre Circuit, Cleveland, Ohio—says:

"For more than 10 years RCA Service has greatly aided us in satisfying our patrons with good sound."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.

was actively anti-American Federation of Labor.

While Debs lived he zealously and fearlessly preached his conviction. Large numbers of wage-earners rallied around him and were influenced by his vigorous, continuous and at times vicious attacks upon the Federation, its leaders and in particular Samuel Gompers, who was one of the Federation's founders in 1881 and its president for many years.

While the American Railway Union was challenging the international unions, another virile, though mistaken, labor movement developed in the inter-mountain region of the West. In 1893 the metal miners of the Coeur d'Alene district of Idaho had their strike crushed through the employment of mine guards who did not hesitate to shoot, and the state militia, many of whose members recruited at that time were Western "bad men" with court records for crimes of violence.

Western Industrial Union

Defeated in their strike but not defeated in spirit, the strike leaders, with representatives from other metal mining districts, met at Butte, Montana, in 1893 and organized the Western Federation of Miners.

This union, influenced to some extent by the Marxian philosophy, established an industrial form of organization, in some mining camps, taking the newsboys, bootblacks, barbers, store clerks and all other workmen into their union. Some of the crafts already organized were forced to surrender and join the Western Federation of Miners or leave

the camp, as it was no longer safe for them.

The craft unions of Butte itself, where the Western Federation of Miners was born, were an interesting exception to this craft surrender. A number of crafts had been organized at Butte as early as 1890. These unions may not have been enthusiastically loyal to all of the policies of the American Federation of Labor. There was a Western independence in their breasts restraining them from taking too much for granted what came from Eastern leaders or from the A. F. of L. But they were nevertheless craftsmen and determined to hold their ground as such.

All efforts of the miners to compel them to surrender—and some of these involved force—were fruitless. With a fierce determination the crafts held their ground. When the Western Federation of Miners was replaced in Butte by the Industrial Workers of the World, the I. W. W. also tried to destroy the crafts, and again the craft unions more than held their ground.

[To Be Continued]

PERSONNEL

CLYDE N. MOULIN has been named general manager of Eastman Kodak Stores with headquarters in Rochester, N. Y. MOULIN, who served in Omaha, Denver, Detroit, Kansas City and Chicago, will have ALEX R. ULLRICH, formerly of N. Y. City as assistant general manager, and ROBERT O'BOLGER, who served Kodak in the Orient, as general assistant.

ALLEN G. SMITH, who has been serving as manager of National Theatre Supply Co.'s Chicago branch, has been appointed manager of that company's N. Y. City branch, succeeding JAMES FRANK, JR., resigned. The latter's plans for the future have not been disclosed as yet.

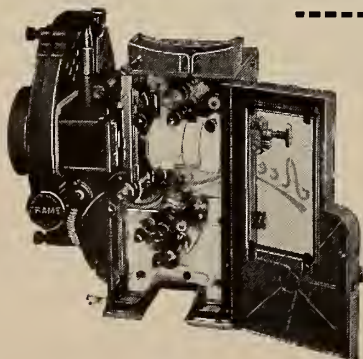
The new Chicago branch manager is ROY P. ROSSER, formerly at the Albany, branch and more recently assistant export manager for NTS.

New assistant manager for Western Electric Co. (Caribbean division) is DENNIS L. SMITH, who will be in charge of the Caracas, Venezuela, office, supervising motion picture equipment distribution and servicing. SMITH formerly served W. E. in India.

E. W. MCCLELLAN, assistant engineering chief for Westrex Corp., has left on a three-month trip to North Africa, India, Southeast Asia and Australasia. He will conduct intensive training courses for Westrex field engineers.

STEPHEN WIEDEMANN has been appointed managing director of the Swedish Western Electric Co. Aktiebolag. From Stockholm he will supervise distribution of motion picture and other electronic equipment and theatre servicing in Sweden, Norway, and Finland. WIEDEMANN formerly managed the South African branch of W.E.

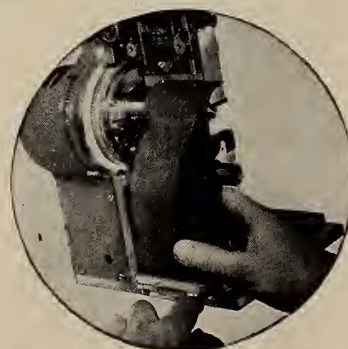
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LETTERS TO THE EDITOR

(Continued from page 11)

proved by the substitution of a solid screen for a perforated one.

The advantages of solid screens are obvious: they reflect more light, they make possible better picture definition, and they are more easily cleaned and resurfaced. A perforated screen with some of the holes plugged up by dirt or by a poor resurfacing job is a bad thing in every way.

Sound servicemen are invited to express their opinions on this subject.

ROBERT A. MITCHELL
Contributing Editor, IP

Editor, International Projectionist.

I was very happy to note R. A. Mitchell's comments on round corner screen images in your December issue. We have been using round corners at the Edina Theatre for the past 13 years, despite the fact that we know we are very much in the minority.

We're squarely (?) behind the round-corner screen image because we believe it gives a more pleasing picture free from the contrasting distraction induced by the sharp square-corner picture. We'd like to have an opinion on this topic by the Projection Committee of the SMPE.

AL KNIPER
Edina Theatre, Minneapolis, Minn.

Editor, International Projectionist.

About this measurement of film to ascertain correct running time: I work in a third-run house and we are required to figure our own schedules. Our films seldom arrive in time to permit careful inspection, much less run through a footage measuring device.

I have discovered that Paramount and a couple other companies have marked on the outside edge at the foot of each reel the exact footage therein. For example, Reel 1 will be marked "A-1800"; Reel 2,

"B-1762," etc. In such instances we simply add the footage for each reel to get the over-all total.

Other companies, notably Universal, divide their double reels into two parts as follows: the first half of Reel 1 will be marked "A-1816," while the second half will be marked "B-1984." By adding the last three digits in each marking—816 and 984—we obtain the total footage for the entire reel.

Action by SMPE Urged

This is by no means the ideal solution to the problem of determining correct running time. Why can't that Projection Practice Committee of the SMPE stick a

few pins in these exchange fellows and give us a welcome respite from those involved equations anent magnetic recording and the like? Each reel band should bear correct footage markings, including any deletions made in either the projection room or the exchange.

We receive features where some helpful brother projectionist has marked the running time on the reel band. This is all to the good and very much appreciated, but the custom is not widespread. Let's get after these distribution fellows and see that they follow through to their exchanges.

MILTON HUFFAKER
Marion, Indiana

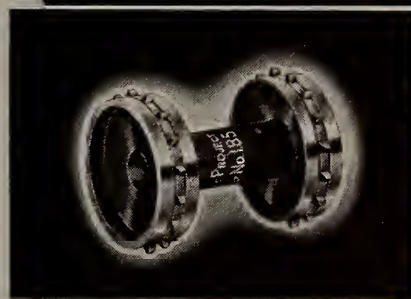
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on their tenth anniversary of service to the motion picture industry.*

200-Inch Mirror Now in Position

The 200-inch mirror now installed on Palomar Mountain, Calif., is not yet ready for practical use for lack of an eyepiece, among other things. It is not the mirror that magnifies but the eyepiece, which is nothing more than a compound microscope. The mirror simply gathers light, and the more light it gathers the brighter is the small image at the focus and hence the greater the amount of light that can be spread over an area by magnification.

The first test observations were made to determine just where the axis of the telescope intersects the photographic plate and to check the entire instrument in action. More testing lies ahead, so much more that the telescope will not be ready for research until next summer.

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16-MM PROJECTION

(Continued from page 16)

music, special attention should be given the rear wall. The loudspeaker used in connection with sound film projection is usually pointed at the rear wall, resulting in direct reflection of the sound from that surface. Although the reverberation time of sound reflected from all surfaces in the room affects its listening qualities, sound reflected from the back wall is the biggest problem.

The length of the air-sound path to

the rear wall is usually the longest in the room and, therefore, reflections from it are frequently the cause of annoying echoes. Treatment of the back wall with an absorbent acoustical material will usually eliminate or diminish any unsatisfactory reflection from this surface and will often be the only correction needed.

Location of Loudspeakers

For better illusion it is desirable to make the reproduced sound seem to come from as near the image as possible. In a room used for occasional projection the portable loudspeaker may be placed on a convenient table or stand so that the sound is directed out and over the seated audience without obstruction. In the large auditorium one or more portable or permanently mounted loudspeakers may be used, depending upon auditorium size and design.

Where permanent loudspeakers are installed in the room as a part of a central sound system, the sound line may be plugged into a convenient loudspeaker outlet in the rear of the room which connects directly with the permanent loudspeaker in the front of the room. In doing this, however, it should be noted that the portable loudspeaker sold with the 16-mm projector is balanced with the soundhead and amplifier contained within the projector.

Because the loudspeaker furnished with the projector is a carefully correlated unit it cannot always be indiscriminately replaced by another loudspeaker. The manufacturer of the projector equipment should be consulted if this change is contemplated. It should also be remembered that when the permanent loudspeaker is being used in conjunction with the projector, it is not available for emergency signals or announcements through the central sound system.

Projector and Speaker Wiring

The two most important points to be remembered in connection with wiring to projector and loudspeakers are (1) that large enough wire with convenient outlets be used to bring a.c. power to the projector and (2) that sufficient loudspeaker outlets be provided in strategic locations.

The average 16-mm sound film projector does not consume more than 1500 watts of power but does represent a considerable additional power load on a room's power line when tied in with other auxiliary equipment such as turntables or recorders. To permit convenience in locating the sound film projector in various parts of the room, several a.c. power outlets should be provided on two or more separate circuits.

One loudspeaker outlet should be installed at the rear of the room to pick up the sound line from the projector. Wire

and conduit should be extended from this outlet to a companion outlet in the front of the room. The front outlet in turn may connect with any permanent loudspeaker in the room or may serve a portable loudspeaker. This arrangement of outlets and connections eliminates long runs of floor cable.

Room Illumination

Rooms not designed for projection purposes require a complete set of drapes or blinds to permit the showing of pictures. An easily operated type of drape which is



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capable of covering a wide expanse of window area in a simple operation is desirable. Dark colored, closely woven, fire-resistant materials are available for this purpose. A small valence or built-in pocket protects the operating mechanism from injury and improves the appearance of the installation.

A small amount of general illumination (approximately 1/10 foot-candle) is desirable for the most comfortable viewing of the picture. This illumination is low enough so that audience attention is not diverted from the screen to other objects in the room. Room illumination should be reduced to this value to secure best results.

In the absence of a more accurate measurement, a quick check of room illumination may be made by holding a newspaper 10 inches from the eye and determining whether the print can be read at that distance. It is difficult, but not impossible, to read the print with 1/10 foot-candle illumination.

Screen Illumination

In cases where it is difficult or impossible to reduce room illumination to this value, viewing of the projected image may be improved by providing the screen with a light shield, commonly known as

a shadowbox. The shadowbox is constructed over the top and down the sides of the screen with sufficient flare to shield the screen from extraneous light, but not to interfere with audience viewing.

A screen which is not properly illuminated cannot be comfortably viewed for the periods of time required for motion picture presentation. If the screen illumination is too low, picture tonal quality suffers and it is impossible for the eye to resolve all the detail present in the picture. It is especially unsatisfactory for spectators in the rear rows of seats.

Excessive Illumination Ills

While too little illumination is more frequently encountered in 16-mm projection than excessive illumination, too bright a picture may have equally unsatisfactory results. If the screen is too bright, optical fatigue and general audience discomfort result because contrast between the projected image and the surrounding area is too great, highlights are dazzling, and flickering sometimes appears. Also, the picture has a washed-out appearance and tonal quality is affected. For spectators near the screen picture graininess becomes objectionably apparent.

BOOK REVIEW

FILMS IN BUSINESS AND INDUSTRY, by Henry Clay Gibson; 265 pages plus index, glossary of terms and an appendix listing sources of films and equipment, catalogues, and periodicals. McGraw Hill Book Co., N. Y. City. \$4.

Designed expressly for business executives, this book covers every phase of the preparation, production and distribution of motion pictures and slide-films, whether 35- or 16-mm, in color or in black-and-white. The author is particularly qualified for this task, since his experience in this field has been both long and diverse.

The book is strictly non-technical in character, is profusely illustrated, and overall shapes up as a "must" for those engaged in the non-theatrical field. All developments in this field within the past 50 years are chronicled in detail, as are those advances in the art which have made industrial films such a potent factor in the business world.

Technical Phase Not Neglected

This is not to imply that the author's approach is strictly on the psychological side; on the contrary, the techniques of production and showing are accorded full and accurate attention, even to the procedures for animation and sound recording.

The volume also discusses the use of films in television broadcasting, the author hazarding the prediction that competition between the theatrical film and video will be intense. Pure merit will decide the issue, holds the author, because video cannot depend upon its novelty alone to win and hold adherents.



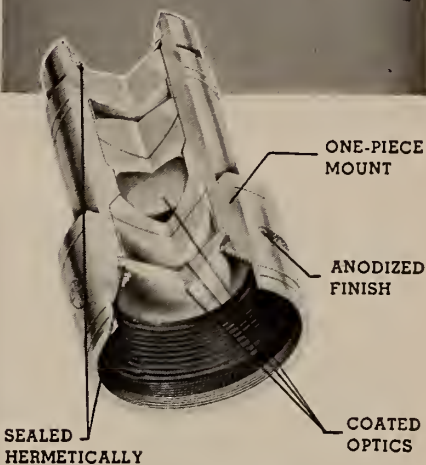
HENRY REEVE—Owner, Mission Theatre, Menard, Texas, and President of Texas Theatre Owners, Inc.—declares:

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TELECASTS

(Continued from page 21)

headed Dalite job. The picture was 8x10 feet, with quality about 50% of a normal newsreel production. Tele projector was set up in the fifth row of auditorium.

Paramount System Clicks

"The second portion of this demonstration consisted of a 'preview' of a program given later the same evening to Pacific Coast Section of the SMPE. Presided over by Loren Ryder, SMPE prexy and Paramount's



EVERETT HAGLUND—General Manager, Gollos Theatre Circuit (9 theatres), Chicago, Illinois—writes:

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director of recording, this unveiled the Paramount 35-mm film method.

"Ryder explained that the film was photographed from a tele receiver located in the Paramount Theatre, N. Y. City, and was ready for projection in 66 seconds. Image was projected by the regular theatre projection equipment and covered the full 20-foot screen. Quality was about 80% of normal newsreel product.

"Comment from the exhibitors present indicated that this system could be the answer to the \$64 question. Their opinions are naturally governed by the economic factors involved, mainly the extra manpower required.

"While we're at it, the projectionist—John Sickinger, Local 150—was a real eager beaver on all this stuff and deserves more than a nod for a quality job in keeping the projectionist very much to the forefront."

Colonial gave a similar demonstration in New York City on February 12 to an invited audience of 1000. Same technical setup as that used in L. A. was utilized, and both rear- and front-projection was used. Rear projection images were 5x7 feet; front projection images were 7x9 feet.

Colonial N. Y. Show NSG

Very noticeable to IP representative that the larger the image the less definition, contrast and resolution, which at best could be rated only as fair. Antenna evidently was precisely oriented with the NBC transmitter, because when switch was made to another channel (WABD-DuMont) a wrestling bout provided the extraordinary spectacle of four wrestlers and two referees.

* * *

Colonial figured in still another development during the month when a sched-

uled interpolation of a tele pickup show into the regular motion picture fare of the RKO 58th St. Theatre (N. Y. City) was suddenly cancelled following the preemptory demand of RCA that no tele airing on its channel could be shown in any picture house to which admission was charged.

This action by NBC was giving the film industry just as good as it has been dishing out to the video boys for many months past by refusing permission to use the major producers' pictures for tele airing. Colonial outfit was plenty miffed over the incident, with its top executive being heard to proclaim long and loudly that he was ready to spend \$2 million dollars to prove his right to equal rights with NBC to "freedom of the air."

NBC appeared entirely unperturbed about this latest excursion into the "public domain."

SELENIUM FOR RECTIFIERS

(Continued from page 12)

suitable circuit, our hookup would serve admirably as a rectifier.

In fact, the modern rectifier is merely a refinement of the data adduced by the early investigators in the art. The modern selenium rectifier as we know it was developed in Germany about 1928 and was introduced in the United States about 1938.

The selenium rectifier owes its popularity to its high degree of electrical flexibility—that is, it can be used in almost any type of circuit despite widely differing characteristics, and it has a high voltage rating per plate.

It seems important to state here that selenium rectifiers undergo no noteworthy chemical or physical change once they have been in operation for a short time, and there is no limit to their useful efficient life when they are operated within recommended ratings.

New RCA Video Magnifier

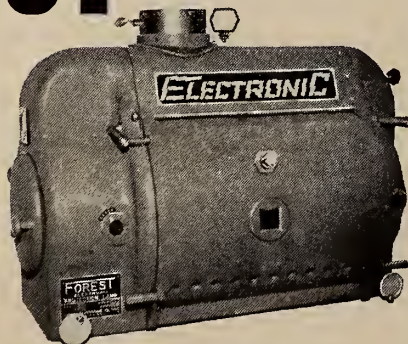
An ingenious new television picture magnifier that enlarges the images received on seven or ten-inch television picture tubes to the approximate equivalent in size and brilliance of those produced by a 15-inch picture tube is available through RCA. A unique application of plastics in the optical field, this new picture magnifier is a transparent Plexiglas lens filled with a clear oil having the same optical properties as the plastic material, transforming it into a true optical lens.

In use, the magnifier is positioned in front of the viewing screen of the television receiver producing a picture area nearly three times the area of the directly viewed picture on a 7-inch tube. Although magnification obtained from the liquid-filled lens is equal to a similar lens made of solid glass or plastic, the new lens weighs much less and transmits more light, resulting in clearer, brighter images.

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PROJECTION ROOM VENTILATION

(Continued from page 22)

proper, if such a control be provided.

This exhaust system shall be operated by an exhaust fan or blower having a capacity of not less than 50 cubic-feet of air per minute for each arc lamp con-

tilating systems of the theatre proper.

The emergency position of this fan shall be controlled by a switch (Fig. 2) operated automatically by the shutter control system, when the latter is actuated either manually or by melting of the fusible links. This exhaust fan shall be electrically connected to the emer-

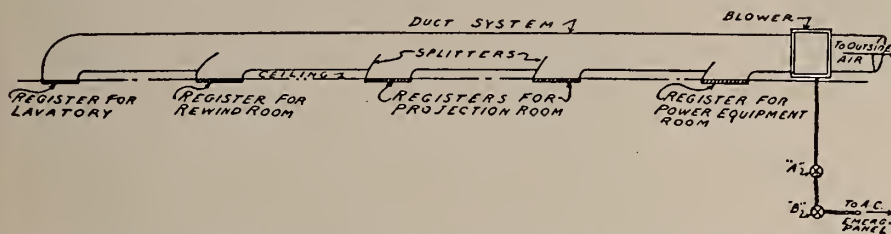


FIG. 2. General and emergency ventilation system: normal blower capacity 200 cu. ft. per min.; emergency capacity 2000 cu. ft. per min. (A) Switch and pilot lamp for normal operation, inside projection room. (B) Switch and pilot lamp for emergency operation, outside door of projection room; also connected to port fire-shutter control mechanism. (Two or more fresh-air intakes required at or near the floor at opposite ends of the room.)

nected thereto. The exhaust fan or blower shall be electrically connected to the projection room wiring system and shall be controlled by a separate switch, with pilot lamp, within the projection room proper.

Minimum Air Circulation

There shall be at no time less than 15 cubic-feet of air per minute through each lamphouse into this exhaust system. Fig. 1 shows the general arrangement. The ducts shall be of non-combustible material, and shall be kept at least 2 inches from combustible material or separated therefrom by approved non-combustible material, not less than 1 inch thick.

The fresh-air supply to the projection room shall consist of not less than two intake ducts located at or near the floor and at opposite ends of the room, and shall be connected into the main air-supply ducts of the building. *There shall be no connection between this air-supply system and any of the exhaust systems of the projection room.*

It is recommended that gravity-operated dampers connected to the emergency porthole release system be installed in the fresh-air intake registers to prevent smoke from entering the main theatre fresh-air duct system, in case of a fire in the projection room area.

Over-all Room Ventilation

The projection room exhaust system shall be a positive mechanical exhaust system having a normal capacity of not less than 200 cubic feet per minute and having an auxiliary emergency capacity of not less than 1000 cubic-feet per minute for operation in emergency, i. e., fire. The ventilation system shall terminate in ceiling grilles in the projection room, which shall not be less than two in number. *In no case shall this room exhaust system be connected into any of the ven-*

gency lighting system of the building. Control shall be provided for manual operation of this fan from a point immediately outside the projection room proper, in addition to the emergency control in the shutter system.

[NOTE: Elsewhere in the same report The Committee states emphatically that "there shall be no connection between the projection arc exhaust system and any part of the rewind ventilating system."]

Your Best Buy . . .

U. S. SAVINGS BONDS

IN THE SPOTLIGHT

(Continued from page 19)

Subsequent-run houses are on a 42-hour weekly basis, with same daily leeway regarding overtime provided. More than 130 theatres are involved in the deal.

Congratulations are due to the entire Local 150 membership for standing fast during these negotiations, and particularly to George J. Schaffer, business representative, and Charley Vencill, secretary-treasurer, for their untiring determined efforts to effect a settlement.

• Many new names were added to the membership rolls of Canadian Famous Players 25 Year Club. Employees of 25 years or more are eligible to membership in this Club, and among those elected last month were W. B. Allen, A. E. Barber, Fred Packebusch, Edmonton Local 371; Al Dennison, Winnipeg Local 299; H. H. Eckert, St. Catharines Local 461; Archie Fraser, Brantford Local 582; Francis A. Moran, Regina Local 295; Tommie Hoad, Harry C. Jarman, and Al J. Massey, Toronto Local 173. New members are given the choice of either a \$100 bond or a gold watch.

• Bert S. Bell, charter member of Local 380, Oklahoma City, Okla., was elected director of India Temple Shrine at Oklahoma City. Bell, long active in Masonry, is a member of Lodge 36 A. F. & A. M., assistant director of the Consistory Valley of Guthrie, Okla.; and is captain general of Bethlehem Commandry 45, Knights Templar.




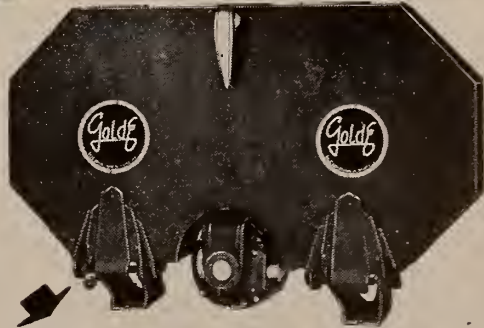
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Low Maintenance Cost
Positive Friction . . . Will Not Clinch Film

Modern, Compact Design
"Tilt-back" Case . . . Reels Can't Fly Off

MONTHLY CHAT

(Continued from page 3)

atres are the ones who *really* count in terms of both mass patronage and overall industry balance sheet.

It's the little fellow we're concerned about here, because a film break in scores of little houses can be much more destructive of industry prestige than an occasional break in the de-luxers.

IP readers, of course, are well posted on this situation, not only as to the physical handling of such film but even on the score of specific titles of pictures on acetate stock now circulating. Our experience in connection with the "If Winter Comes" release, however, at a time when we naively assumed that Trucolor had a corner on all available acetate stock, occasions considerable doubt as to just how smoothly the changeover in prints will be effected.

The key man in this situation is the projectionist: it's squarely up to him, elaborate advance preparations for exchange cooperation notwithstanding. From this moment on projectionists should examine with the utmost care *every print* that comes into their projection rooms. The one sure way to identify a print is to refer to the edge-markings which appear about every foot throughout its length.

The transition period promises to be difficult as a result of those slip-ups due to human error which just cannot be avoided. However, if projectionists are on their toes the margin of error may be held to a small percentage. Observe the following instructions:

1. For many months to come it will be necessary for all projection rooms to have available a film cement that will splice *both* nitrate and acetate prints. A listing of such cements is appended hereto.
2. The emulsion must be scraped clean on *both* surfaces which are to be spliced. There should be no overlapping of unscraped emulsions on the ends to be joined.
3. The film may be scraped either wet or dry. If it be scraped wet, apply an initial coating of cement to *each* scraped area, wiping it off immediately. Then apply a second coating and make the splice. Use a razor blade for scraping, but be careful not to score the film, as this may cause a break if the splice is bent. *Scrape on a straight line.*
4. After the splice is made maintain pressure thereon for at least 10 seconds.

Projectionists should be particularly alert in the case of *foreign films*, many of which are printed on acetate stock. Just recently the crew at a film company home office received a picture "Mission Speciale" printed on Gevaert (Belgian) stock (21 reels) and experienced no end

of difficulty before they discovered it was acetate. *There were no edge-markings.* Watch these foreign releases!

IP will do its utmost to obtain the cooperation of all distributors of film to theatres to the end that all prints are prominently identified as to their character. If possible, IP will try to obtain the titles of all releases printed on acetate stock; although this may be carrying optimism to an extreme. The best advice IP can give at the moment is:

Don't rely on the exchanges. Check the edge-markings of every print received.

Recommended film cements that will splice satisfactorily *both* nitrate and acetate stocks are listed below. These cements may be had at practically all theatre supply dealers, but if not, address the manufacturer direct:

FILM WELD—Larry Strong, Inc., 1438 No. Clark St., Chicago, 10, Ill.

KODAK FILM CEMENT—Eastman Kodak Co., Rochester, N. Y.

ROSCO ALL-PURPOSE CEMENT—Roscoe Laboratories, 367 Hudson Ave., Brooklyn, N. Y.

Revise Electric Unit Values

New values of the electrical units were introduced on January 1 by the U. S. Bureau of Standards. These changes have become necessary because in the years since the various standards were originally established, it has become possible to measure them with greater precision. Changes have been under consideration by an international committee for the last 20 years, and were scheduled to go into effect in 1940, but were postponed by the war.

The values of the new, or absolute, units in terms of the old, or international, units are given in the accompanying table, which is based on figures published by the Bureau of Standards in Circular C-459. Since the changes are small, in only three instances approaching 0.05%, they will affect for the most part only high-precision measurements.

In the appended listing of the new values the abbreviation "ab." in the first column denotes the word "absolute"; while the "int." in the second column denotes the word "international":

1 ab. ohm	= 0.999505 int. ohm (U.S.)
1 ab. volt	= 0.99967 int. volt (U.S.)
1 ab. ampere	= 1.000165 int. ampere
1 ab. coulomb	= 1.000165 int. coulomb
1 ab. henry	= 0.999505 int. henry
1 ab. farad	= 1.000495 int. farad
1 ab. watt	= 0.999835 int. watt
1 ab. joule	= 0.999835 int. joule

On-Train Movie Service to Be Extended by the C.&O.

Vigorously denying reports that it intended to discontinue its on-train motion picture program, the Chesapeake & Ohio Railway has informed IP that it has already expanded the program since it was inaugurated and contemplates an extension of the service soon to all its main-line trains.

Stating that the film program has proved

Current Acetate Releases

Herewith a list, so far as IP has been able to determine, of all current releases on acetate film. Practically all these prints are Trucolor releases through Republic Pictures; but projectionists are cautioned to examine carefully all prints received from now on.

REPUBLIC PICTURES (TRUCOLOR)

Along the Oregon Trail

Apache Rose

Bells Of San Angelo

Bill And Co

Home On the Range

Man From Rainbow Valley

On The Old Spanish Trail

Out California Way

Springtime In The Sierras

The Gay Rancheroo

That's My Gal

The Last Frontier Uprising

Under Colorado Skies

It's A Grand Old Hag (Cartoon)

METRO-GOLDWYN-MAYER

If Winter Comes

NOTE: A special acetate print of M-G-M's "Song of Love" (Katherine Hepburn-Robert Walker) went into Radio City Music Hall, N. Y. City, for a four-week test run and may still be in circulation, particularly in the New York Metropolitan area. Watch for it.

to be highly popular with its passengers, the C. & O. notes that film shows are now given on Trains Nos. 41 and 42, operating between Newport News and Cincinnati, in addition to Trains Nos. 1 and 2 on the Washington-Cincinnati run.

No changes have been made in the equipment setup since the program was launched, and a further expansion of the program awaits only the conversion of additional railway cars. "We certainly have no intention of discontinuing this service," concludes the C. & O. statement.

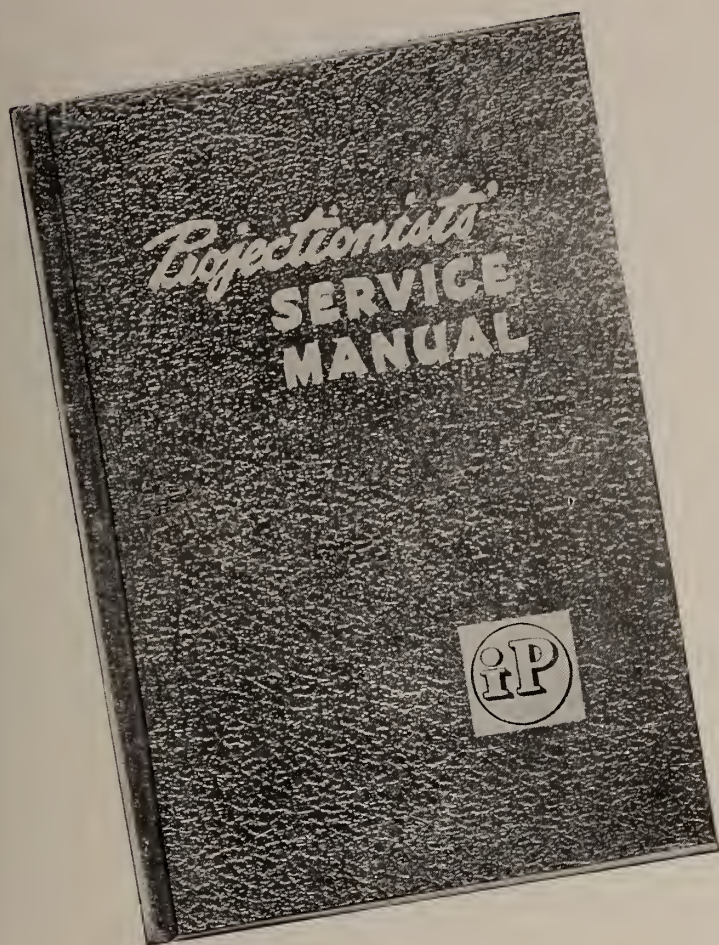
I.A. projectionists exclusively are used by the C. & O., which pioneered the on-train movie service.

Enemy Technical Data in Demand

The Office of Technical Services, U. S. Department of Commerce, reports that American businessmen are currently buying OTS reports on German and Japanese technology, as well as on American research, at the rate of \$1,000 worth daily. The reports are priced at 10 cents to several dollars each. Abstracts of the reports are contained in the weekly Bibliography which is available from the Superintendent of Documents at \$10 a year. Checks are payable to the Treasurer of the United States.

OTS now has available a classified list of 1,800 reports on German, Japanese and American wartime technology.

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complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only \$3 per copy, postage prepaid.

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HENRY B. SELLWOOD, *Editor*

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MARCH 1948

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MONTHLY CHAT

MOST significant item, to this corner, in the data adduced by the Screen Brightness Committee of the SMPE in a preliminary report on its long-range program of on-the-scene plotting of screen illumination practices in the theatre field, is that the projectionist craft is getting that kind of projection it deserves—no more, no less. That's our conclusion after digesting the Committee's report published elsewhere herein.

The Committee deals with many aspects of the projection process which bear directly upon the quality of the screen image. This corner is especially concerned with the implied criticism of the projectionist craft in that section relating to the large number of theatres in which the light output from the projector, *not* the reflected light from the screen, fell far short of that level which long experience and careful checking indicate could be reasonably expected from a particular equipment setup.

Extremely revealing are the following figures: only 17½% of the theatres checked obtained all the light to be expected from their equipment; 50% of the theatres were getting only from 35 to 75% of the available light, and one-third of the theatre screens at their sides reflected only 33⅓% of the light reflected at their centers. The general ratio of the side-to-center light relationship averaged the dismal range of from 45 to 65% in *all theatres checked*.

There is no ducking the import of these figures. We're all familiar with the penny-pinching exhibitor who resists buying or even repairing any unit until it is practically impossible to project a picture, and we understand that screen reflectivity deteriorates rapidly and that atmospheric conditions are controlling in many situations. But we must keep in mind that the aforementioned figures relate specifically to performance expected *with the equipment available* and under conditions to which *due consideration* was extended. This means, in short, that the screen results noted must be charged up to technique.

Embraced by the term "technique" (and probably responsible for all these deficiencies) are such things as misalignment of arc elements with the aperture, mismatched optical elements (lens to reflector); improper arc gap, downright uncleanness of elements, particularly the optics; and a general disregard of the vitally necessary attention to small details which while relatively insignificant in themselves are cumulatively very important to over-all results.

"But," some projectionists may say, "we can't be properly charged with personal responsibility for mismatched optical elements. We know that our lens and reflector are of different speed, and we know what this means in terms of

(Continued on page 31)

Dort—Flint, Mich. • Corunna—Flint, Mich. • Starlite—Pontiac, Mich. • Super 30—Irwin, Pa. • South Park—Pittsburgh, Pa. •
 Drive-In—Patton Twp., Pa. • Brookside—Sewickley, Pa. • Super Castle—New Castle, Pa. • Ruthorn—Scottsdale, Pa. •
 Sunset Beach—Claysville, Pa. • Union—Union, N. J. • Mohawk—Colony, N. Y. • Binghamton—Binghamton, N. Y. • Drive-
 In—Staten Island, N. Y. • Motor-In—Sutton, Mass. • Broadway—Richmond, Va. • West Point—West Point, Va. • Stockade—
 Williamsburg, Va. • Drive-In—Richmond, Va. • Drive-In—Norfolk, Va. • Lincoln—Philadelphia, Pa. • Dixie—Shively, Ky. •
 Dixie Gardens—Covington, Ky. • Florence—Florence, Ky. • Beckley Open Air—Beckley, W. Va. • Trail—Belle, W. Va. •
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 Minn. • Illinois—Morton Grove, Ill. • Skyview—Jacksonville, Fla. • Drive-In—Montgomery, Ala. • Drive-In—Sheffield, Ala. •
 Drive-In—Walterboro, S. C. • Drive-In—Auburn, Ala. • Drive-In—Albany, Ga. • Drive-In—Gadsden, Ala. • Drive-In—
 Panama City, Fla. • Drive-In—Homestead, Fla. • Cactus—Albuquerque, N. M. • Belt—St. Joseph, Mo. • "81"—Wichita,
 Kansas • "54"—Wichita, Kansas • Drive-In—Springfield, Mo. • El Norte—El Paso, Tex. • Drive-In—Kansas City, Mo. •
 Community—Topeka, Kansas • Drive-In—Denver, Colo. • "66"—St. Louis, Mo. • Manchester—St. Louis, Mo. • Drive-In—
 E. St. Louis, Ill. • Joplin—Joplin, Mo. • "71"—Kansas City, Mo. • N.W.—Oklahoma City, Okla. • Enid—Enid, Okla. • "66"—
 Tulsa, Okla. • Chalk Hill—Dallas, Tex. • Northwest Hi Way—Dallas, Tex. • Bowie Blvd.—Fort Worth, Tex. • Fredericks-
 burg Rd.—San Antonio, Tex. • Circle—Waco, Tex. • Cactus—Pharr, Tex. • Trail—San Antonio, Tex. • Winkler—Houston,
 Tex. • Shepherd—Houston, Tex. • Chief—Austin, Tex. • Surf—Port Arthur, Tex. • El Paso—El Paso, Tex. • Boise—
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 field, Calif. • El Rancho—El Centro, Calif. • Motor-In—Fresno, Calif. • Motor-In—Modesto, Calif. • Drive-In—Boulder
 Creek, Calif. • Drive-In—Pittsburg, Calif. • East Bay—Oakland, Calif. • Motor-Movie—Hayward, Calif. • Drive-In—
 Oakland, Calif. • Drive-In—San Jose, Calif. • Drive-In—Redwood City, Calif. • Drive-In—Santa Rosa, Calif. • Drive-In—
 Portland, Ore. • Starlight—Tacoma, Wash. • Snow King—Everett, Wash. • Auto-View—Seattle, Wash. • Auto-View—
 Eugene, Ore. • Auto-View—Salem, Ore. • East Side—Detroit, Mich. • West Side—Detroit, Mich. • Sunrise Auto—Long
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 dence, R. I. • Open Air—Lynn, Mass. • Merrimack Auto Park—Methuen, Mass. • Drive-In—Newington, Conn. • Drive-In—
 Milford, Conn. • Bay State—Seekonk, Mass. • Moviedrome—Salisbury, Mass. • Dartmouth—Dartmouth, Mass. •
 Drive-In—Beltsville, Md. • Mt. Vernon—Arlington, Va. • Drive-In—Louisville, Ky. • Blue Grass—Georgetown, Ky. • Irvine—
 Irvine, Ky. • Stockton Outdoor Auto—Hamilton, Ohio • Drive-In—Montgomery, Ohio • East—Cleveland, Ohio • West—
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 Laverne—Niles, Ohio • Sky-Hi—Youngstown, Ohio • Boyers Auto—Strasburg, Ohio • Outdoor—Chicago, Ill. • Drive-In—
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 Calif. • Orange—Santa Ana, Calif. • Phoenix—Phoenix, Ariz. • Motor-In—Concord, Calif. • Motor-In—Tulare, Calif.
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Projection Room Handling of Prints

DEFFECTIVE film prints have ever been the bane of projectionists. The projectionist who takes pride and interest in his work, and who has the safety of the public in mind, is justified in complaining when he receives film which is a fire hazard, or which, because of "rain," dirt, oil, and a superfluity of splices, reflects unfavorably upon his work in the eyes and ears of a public ignorant of the projection process.

In connection with the safety factor of prints, the writer of well-known projection textbooks makes the amazing statement that "the projectionist cannot legally be held responsible for accidents resulting from imperfect prints." Projectionists in at least six states and in several large cities had better think twice before accepting that statement! Following are references to strictly enforced laws which hold the projectionist *directly responsible* for accidents arising from the use of bad prints, and the violation of which may result in revocation of the projectionist's license.

CONNECTICUT: Statutes, Ch. 127, Secs. 138, 139.

MAINE: Rule 17 under Secs. 65-72 of Insurance Regulations in Revised Statutes.

MASSACHUSETTS: Statutes, Ch. 280, Sec. 46.

NORTH DAKOTA: Implied in Electricians' Code.

PENNSYLVANIA: Sec. 3, Art. 1, Rule 7 of Moving Picture Regulations.

MICHIGAN: Implied in Statutes, Art. 173, Sec. 11.

CITY OF BALTIMORE: Sec. 10 of Rules & Regulations for Moving Picture Operators.

Significantly, under no circumstances is a projectionist permitted to sign a waiver

By ROBERT A. MITCHELL

relieving him of his responsibilities anent the use of bad prints.

Now what can the projectionist do when he receives prints in poor condition? He may complain to the distributor. (Write to the manager of the exchange. Time is wasted by placing notes in the shipping cases.) He may report the trouble to the officials of his Union. He may (and *must* in some states) bring the matter to the attention of the proper authorities. If a print is so bad that it cannot be rendered safe without spending an unreasonable length of time repairing it, he may rightly refuse to project it.



One of many gigantic machines at Eastman's Kodak Park which convert the honeylike substance known as "dope" into endless sheets of the familiar transparent film base. Material is so clear as to be nearly invisible en route through machine.

Regardless of the results of his efforts to "do something" about bad prints by such drastic measures, he is nevertheless constrained by the ethics of his craft to distinguish carefully between good and bad practice in handling film and to learn the "whys and wherefores" involved.

Motion picture film is not an especially durable article. Not only does it suffer greatly under the wear and tear of ordinary use, but even when left untouched it undergoes deterioration. The film base (celluloid) is subject to loss of camphor and ethereal plasticizers, causing it to shrink and become brittle. The gelatin emulsion may soften or reticulate ("blister" or wrinkle) if subjected to moisture or alkaline fumes.

Although these facts are of greater interest to those entrusted with the long-term storage of film than to projectionists, the writer cites the prevalent foolish notion that film cabinets in projection rooms should be provided with water tanks so arranged that the film placed therein will be exposed to a humid atmosphere, thus presumably preserving the film's pliancy and toughness. Nothing could be more absurd.

Photographic Defects

In the first place, prints are tied up in transit and in exchange vaults most of the time; second, film receives little if any benefit from moisture (camphor is employed in film reconditioning); and third, such humidifying arrangements offer great opportunity for the condensation of moisture droplets in the film emulsion.

Prints are frequently ruined by poor camera work and by faulty printing and processing. "Photographic damage" is

a thing quite apart from physical injury of the film, of course, but it proves an annoying factor to projectionists when it is confused, as it frequently is, with faulty projection.

What projectionist has not at one time or another received complaints of poor light when running a print so dense that no amount of illumination would provide the screen image with satisfactory contrast values? Likewise, "development flicker" may be charged to an unstable arc; incorrect "gamma" (contrast-factor) to a soiled lens; poor camera focus or print "fuzziness" to poor projector focus; and print unsteadiness to troubles in the projector mechanism.

Excluding normal wear and deterioration, more real physical damage is inflicted upon film in packing and shipping than by any other factor. More than nine-tenths of the splices found within the first 50 feet and the last 25 feet of film in the average reel are occasioned by "shipping damage."

Every projectionist recognizes this type of film mutilation: the bent and torn edges that require trimming with scissors and the torn perforations that have to be "smoothed off," or which even necessitate cutting and splicing the film. Shipping damage may be attributed to the shipment of loosely and unevenly rewound film in bent and battered cases.

Projectionists are to be congratulated on the great pains they take to avoid scraping the edges of film-rolls while prying reels from crushed cases.

Damage in Handling

Film frequently suffers from injudicious *handling*—a term employed here to include inspection, repair, and projection—but not all such damage can be attributed to projectionists. The matter of splices immediately comes to mind. Projectionists, as a class, are vastly more painstaking in splicing film than are exchange examiners. The projectionist is, of course, under the urgent necessity of avoiding film breaks and their attendant dangers, and there is also such a thing as professional pride.

Now, the general effects of the careless handling of film include scratches and "rain," oiliness and accumulations of dust, torn and cracked perforations, creased and torn sections of film, defective splices, "sprocketing" indentations, and cue-mark mutilations. Instead of pointing out the specific causes of these forms of damage, it should suffice to recommend procedures by which film may be handled with a minimum of damage and wear.

Injury to prints frequently occurs during the comparatively simple process of pre-show inspection, a "must" for projectionists. In one instance a deep scratch throughout the entire length of a long feature was traced to the fingernails of

an exchange girl. If the projectionist is in the habit of allowing his index finger to rest lightly on the surface of the film, he would be wise to avoid doing so on the emulsion side. New ("green") prints must be handled with extra care, for the emulsion is very soft, having absorbed moisture from the processing baths.

Motor-driven rewinders, highly recommended for routine rewinding during the show, are useless for inspecting film. Hand-driven rewinders can be stopped and started with much less strain on the film. High-speed rewinding must be avoided for several reasons, one of which is the tendency of oily film to loop back upon itself when the rapidly turning reels are brought to a stop. If such a loop in the reel is not discovered and corrected before projection, an accident will occur.

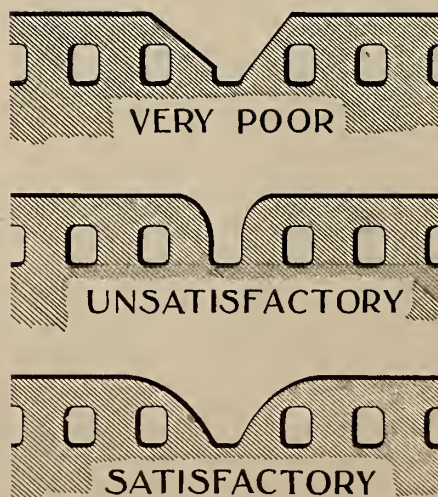
Splices are tested by bending or twisting them very slightly, special attention being directed to the ends. Yanking the film in an effort to pull the splices apart, assuming that they will hold if well made, is bad practice.

Rewinding Procedure

Rewinding at excessively high speeds is a constant temptation to both projectionists and exchange examiners, for both are usually under the pressure of time. Careless rewinding, especially on instruments not equipped with sufficient hold-back on the dummy element, may cause dust particles on the film to scour multitudinous scratches which appear as "rain" in the projected image. Damage to the edges of the film may occur if the rewriter elements are so far out of alignment that the film is scraped by the sides of the reels.

The process of "pulling down" loosely wound rolls of film is an exceedingly injurious practice. Prevue trailers are frequently mistreated in this way. A loosely wound reel of film should be rewound twice at low speed to form a satisfactorily tight roll.

FIG. 1. Showing several methods of smoothing and rounding off torn perforations.



Reels which are bent or otherwise damaged injure the edges of the film. The sides of bent shipping reels may be "spread" on the rewinder, but the consensus of opinion is against the use of shipping reels in the projectors, this despite the request of exchanges not to rewind the film after the last showing. Keep the theatre's projection reels in first-class condition and use no others in the projectors.

The rough edges of film damaged in shipping must be smoothed by trimming with scissors. If this is not done, small chips of film may break off in the projectors or, in extreme cases, the film will tear and break. Torn perforations, too, must be smoothed or rounded off. Fig. 1 illustrates the right and wrong ways of doing this. If more than two consecutive sprocket holes are torn, the film should be cut and spliced. (To avoid cutting on important scenes, some projectionists ingeniously cement patches of clear film over the torn perforations.)

In every case where the projectionist doubts that trimming will render the print safe to run, he should not hesitate to remove the defective sections in their entirety.

Splicing Precautions

The splicing of film is such a commonplace operation that it may seem superfluous to discuss it. But because most projectionists are harassed by innumerable bad splices in prints ostensibly in good condition, further discussion is in order.

Incredible though it seems, there are thousands of theatres in which projectionists are required to effect repairs on film without the aid of mechanical splicers. Now, although a well-made hand splice is nearly as strong as a machine splice, it is apt to buckle and, unless the sound track has been "blooped" with movietone lacquer, it produces a thump or click in the speakers. Moreover, exact registration of the perforations is a matter of luck, so as likely as not the screen image will jump when a hand-made splice passes through the gate.

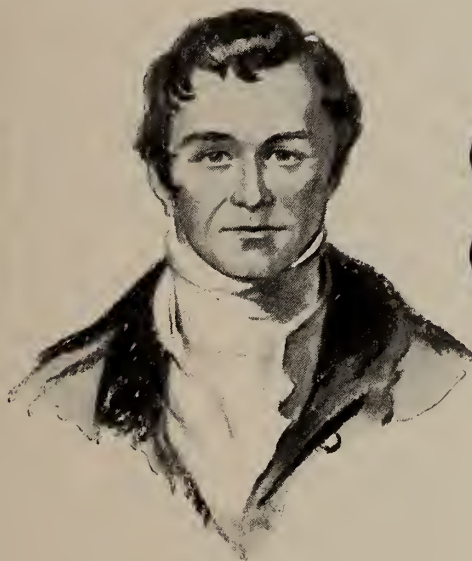
But whether splicing is done by hand or by machine, certain basic rules must be observed if the splice is to provide a smooth joining and is to last for the life of the film.

The scraping must be thorough. It is well to moisten the stub a second time and wipe it with a cloth to remove adhering traces of gelatin. The celluloid side of the film should be wiped free from oil. Film cement should be applied liberally, and the film should not be left in the splicer longer than 6 or 7 seconds, else the splice edges will be weakened by the solvent action of cement squeezed out by pressure. Slight roughening of the

(Continued on page 25)

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As producer of the first arc light in 1800, Sir Humphry Davy was discoverer of the parent light source which today makes possible the fine projection of motion pictures.

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We split that snow-white light up into its individual bands of red, orange, yellow, green, blue, and violet in the monochrometer shown above. Then we measure the intensity of each band by means of electrical impulses.

What do we find?

We find that the light from a "National" High Intensity Carbon Arc is the closest to sunlight of any man-made light. Its color balance is nearly perfect. It insures that your color film will glow with the rich vivid detail that thoroughly satisfies your patrons.

Moreover, a "National" High Intensity Carbon Arc is the most powerful point source of light in existence. It projects pictures that can be seen clearly from every seat in the house. Box-office insurance? Yes, sir!



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THE primary function of a condensing system is to provide maximum illumination on the screen; that there is usually more light on the film gate is secondary. Box-office receipts are a function of screen brightness and not film aperture illumination. Of course, the film gate is the limiting field aperture in the projection system, and since all the light must funnel through the gate, it participates in any increase and thus its image on the screen becomes brighter. The first consideration, however, is to get more light flux to pass through the whole optical train.

The basic physical considerations dictating the present forms of condensing systems are simple. They rest on nothing more difficult than everyday geometry—the kind everyone uses when he looks at a clock or draws straight lines—plus a necessary and very convenient convention regarding the way light is propagated.

With greater demands on condensers to perform more diverse functions ever more efficiently, greater complexity has crept into their design and the primitive principles have been incorporated with more advanced considerations, without, however, losing their cogency. Our principal concern will be with the fundamentals of condenser design, both of lens condensers and mirrors.

The Nature of Light

The ultimate nature of light is unknown. Perhaps it will always be so and remain one of the experiences we cannot reduce to something more primitive, along with life and the spiritual verities. Nevertheless, its behavior has been reduced to a few rules-of-thumb which are sufficient to give some control.

An ideal point source of light radiates equally in all directions throughout space, so that if it were placed at the center of a sphere, the interior would be uniformly illuminated, with no part of

the wall receiving more light energy or flux than any other. It is perfectly clear that the larger areas receive greater flux in direct proportion to their sizes.

Now, it is inconvenient to circumscribe a sphere about a source each time a measurement of light flow or flux is to be made and to express the flux in terms of areas on this sphere, so the area relative to the total area of a unit sphere is used and given a special name. By analogy with plane angles, the area in

Elements of Optical Condensing Systems

By A. E. MURRAY

Scientific Bureau
Bausch & Lomb Optical Company

question is said to subtend a solid angle at the center of the sphere. Thus we can say in more technical language that from a point source the greater the solid angle subtended by a surface, the greater the light flux intercepted; in fact, the two are strictly proportional.

It is worth while to note that these considerations are direct consequences of the convention referred to previously, that is, the rectilinear propagation of light. If light did not travel in straight lines in free space, we could not expect the inner wall of the sphere to be uniformly illuminated, and we should be forced to more complex descriptions.

System as a Pipe Line

But it is inconvenient to represent the true state of affairs in three dimensions on two-dimensional paper, so a compromise is made. In the plane of the paper, technically the meridional section, the solid angle subtended by a surface or a lens at a point source is replaced by the plane angle, and for that infinitely thin fan of rays the flux is proportional to the angle itself.

In the case of a lens system, ideally all the flux collected by the first surface of the system is transmitted through the succeeding surfaces to appear in the

image. In the image space exactly the same sort of considerations apply as at the source: the greater solid angles are associated with the brighter images. Thus the larger the area of the last surface of the system as seen from a point image, the more flux flowing through the point and the brighter it is.

It's a curious fact, readily understood when an optical system is conceived of as a sort of pipe line for light flux, that it does not matter what the illumination or flux density is at any particular point inside the system, the illumination in the final image is fixed by the flux collected by the first surface and the area of the last illuminated surface seen from the image, i.e., the solid angle subtended by the exit pupil.

In more technical language, the illumination at a point on the axis of a system, more particularly at the image, will depend upon three factors: (1) the brightness of the source (2) the light lost in passing through the system and (3) the solid angle subtended by the exit pupil (loosely, the last lens surface) at the point.

In any actual optical system a certain amount of light is lost to the beam through reflection at the various surfaces, and a further amount is lost through absorption in the glass. This is all taken into account in calculating the percentage of useful light passing out.

It may seem strange at first sight that in this relation there is no mention of the solid angle of the cone of light incident on the first or collective surface of the system, whereas it is obvious to the intuition that the flux through an image must depend directly upon the amount collected.

Extended Light Sources

For all well-corrected, image-forming systems (and condenser systems on the whole fall into this category) there is a proportionality between the half angles on the two sides of the system, the ratio being the magnification. The situation at any other point on the axis is slightly more complicated, but in essence the same physical considerations apply.

In practice we have not to deal with point sources but with actual extended

FIG. 1. The light flux within the solid angles w_1 and w_2 is constant; but the flux per unit area (illumination) is less on areas A_3 and A_4 than on areas A_1 and A_2 by just the square of their relative distances from the point source.

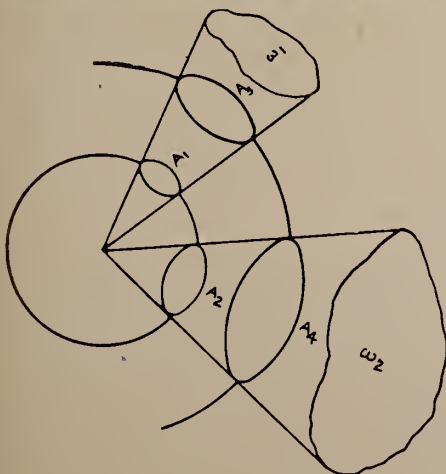
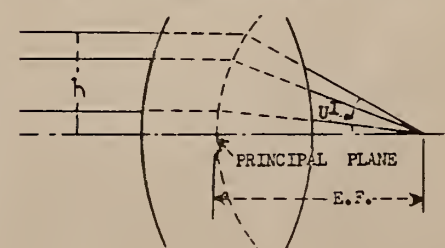


FIG. 2. h is equal to the product of the equivalent focal length and the sine of u' .



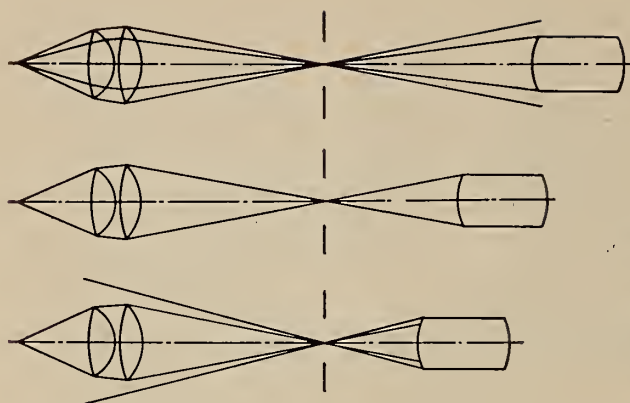


FIGURE 3.

From top to bottom:

If the f number of the condensers is too large, light is spilled around the lens and thus wasted.

When the condenser and lens are matched, all the light is used and none is wasted—a perfect economy.

If the lens is too fast for the condensers the former is effectively stopped down optically.

sources, which act somewhat differently from the commonly considered point origins. The extended source has area, *i.e.*, is an assembly of point sources of finite luminosity and must be treated as such.

Considering more specifically condensing systems, fundamentally their function is to image the light source at the most convenient point in the projection system for optimum performance of the whole system. It is clear that the instance when a source can be placed at the gate of a projector are very few, and as yet those sources amenable to this treatment are quite feeble.

The condensing system, then, has the duty of placing the next best substitute for the source, its image, at that point in the system where it will do the most good. By principles previously established, it does not matter where with respect to the projection objective the source image is placed: the illumination on the screen will depend only upon the source brightness, the transmissivity of the system, and the overall f number.

It is clear from the illustration that when a point source is imaged at the film gate for maximum utilization of the flux through the system, the cone of light from the condensers must just fill the projection objective, *i.e.*, the f number of the condensing system at the film gate must match the f number of the objective.

Condenser-Objective Match

If the solid angle of flux from the condensers is *smaller* at the gate than the objective will accept, the latter is stopped down optically, the overall f number is smaller than the condensers are capable of, and they are not working at full efficiency.

On the other hand, if the condensers deliver a solid angle *greater* than the objective can accept, light is spilled around the objective and fails to get to the screen. In this case, the condensers are optically stopped to the f number of the projection system.

Essentially the same considerations apply in the second type of source imaging—when the source is imaged inside the projection lens, or, more accurately,

in the entrance pupil of the objective. In this arrangement the basic conditions are somewhat less clear, but a moment's thought will show why here, too, the f number of the condensers must match that of the projection lens or the smaller stop becomes the limiting factor.

In practice, with extended real sources the first arrangement, that of imaging the source at the film gate, can be used only with those sources which are uniformly bright over their area, which means that it is confined to arcs. The second method is generally employed

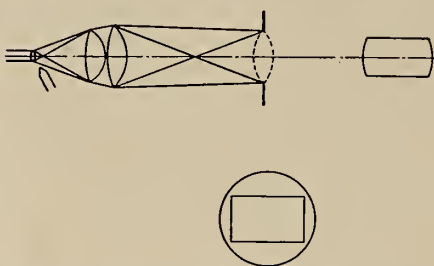
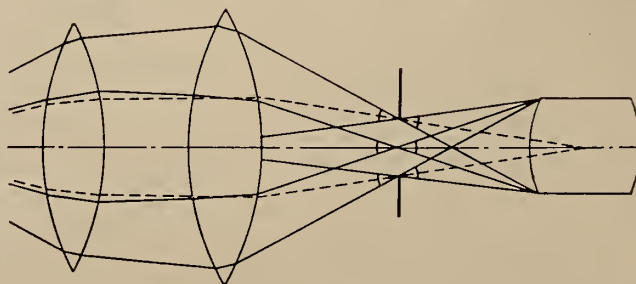


FIG. 5. The common procedure in 35-mm arc projectors. Above: the arc crater is imaged on the film gate. Below: The arc image must be larger than the film gate.

with tungsten sources, which are used most generally outside the field of 35-mm motion picture projection.

[Such diverse applications as sub-standard motion picture projection, slide projection, and photo enlargers employ this arrangement, which indeed is the only one which can be used to assure screen uniformity with a source as non-uniform as the incandescent filament. In this case, the film gate, or field limiting aperture (the conjugate to the screen) is necessarily illuminated evenly because it falls well within the convergent cone.]

FIG. 4. It is necessary to match the f numbers of the condenser and the projection objective even though the source be imaged in the latter. Note that the marked angles at the film gate are approximately equal.



As a sidelight, it is clear that the last surface of the condenser lens appears uniformly illuminated. It is this uniformly illuminated surface which serves as the virtual source for the gate, wherever it may be, from within a few mm of the condenser in enlargers and Balopticon projections to a considerable distance as in motion picture projection.

The second arrangement obviously provides a more compact system at a given f number and focal length projection objective.

Relay Condenser System

A third arrangement has found some application in special problems. This arrangement is essentially the second in that an image of the source is placed in the entrance pupil of the projection lens, but by aid of two extra lenses in the train the gate illumination is increased and made much more uniform. The two extra lenses relay the images of one of the condensers and the filament to their appropriate places, thus the name "relay system".

In a conventional aspheric condenser system (Fig. 6) C_1 is used to image the light source in the lens C_2 , which images the last surface of the condenser C_1 on the gate. We have already seen that this surface is uniformly illuminated. At the gate is placed a third condenser lens, C_3 , which images lens C_2 and the filament image in the projection lens.

To cut down the spill of light at the gate, the condensers C_1 may be masked as shown in the illustration. This arrangement has the advantage of greater illumination and potentially greater uniformity, but these advantages are purchased at the cost of complications in added lenses and light lost through reflection and absorption. Of course, lens C_3 , which receives the filament image must be of highly heat-resistant glass.

In order to collect as much flux as possible, the light sources are placed as close as practicable to the first lens of the condensing system. This has the effect of producing a magnified image of the source.

In the first arrangement, the arc is imaged at the film gate at a magnification just sufficient to give an illuminated area covering the corners of the gate. This generally suffices to give an evenly illuminated gate, if the arc itself is uniform, but because the gate is not square

a certain amount of useful light is lost in illuminating the long sides of the aperture.

In the second type of condensing system, due regard must be paid to the size of the image of the filament as well as to the f number of the system, for if the image is too large for the projection lens, light will be wasted, while if it is too small, the lens may be stepped down optically and thus not deliver the maximum light.

Reducing Spill Light

An attempt is often made in motion picture projectors to reduce the amount of spill light at the long sides of the gate by using a cylindrical surface with horizontal axis on one of the condensers.

With the proper distribution of power in the condensing system, this will produce an elliptical spot with the minimum spill of light. With a diffusing medium such as film in the gate, this technique leads to greater uniformity as well as more useful flux flowing through the gate. Optically, the round arc image is flattened the better to fit the gate, and two real images are produced of the arc (images elliptical in shape) at right angles to one another and differently situated on the axis.

Theoretically, with point sources and with perfect condensers, this would mean that since only one source image could be placed at the gate, the other image falling either before or behind the gate could not match the f number of the objective, thus light would be either wasted or the full potentialities of the objective would not be used. The condensers obviously have two different f numbers in the two meridians.

In practice, however, arc craters are of finite size, and because the film is diffusing and thus can even out the f number discrepancy—and more cogently, because no system is perfect—spherical aberration introduces enough complication that a real gain seems to be found.

The imagery demanded of condensers is not of the same order of magnitude as that required of photographic or projection objectives, but still the requirement that they deliver the maximum flux in use calls for careful design. Condensers are not required to image very large angular fields, *i.e.*, they must work close to the axis, so it is possible to

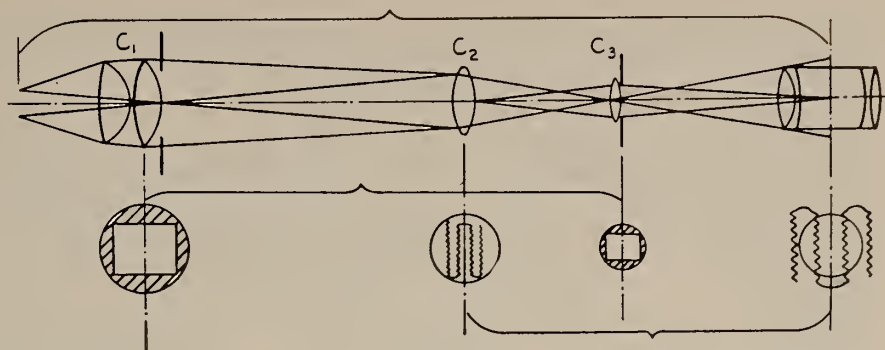


FIG. 6. A typical condenser relay system. Conjugate images are bracketed together.

achieve satisfactory performance with relatively few surfaces, and the aberrations of the oblique pencils have relatively little weight in their design.

Spherical Aberration Effects

It is clear that in the case of a point source, with either arrangement of source image, in the gate or in the projection lens, spherical aberration in the condensers leads to impaired efficiency. Spherical aberration is that behavior of centered systems, not necessarily consisting of spherical surfaces, characterized by differing focal points for the

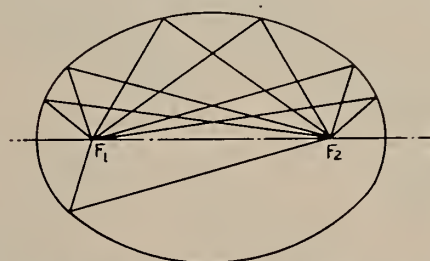


FIG. 8. Illustrating the focal property of the ellipse. Any fan of rays, of arbitrary solid angle with apex at one focus, is imaged at the other focus with no spherical aberration. This is true only for point sources.

various zones of the system. Those rays traveling close to the axis will find their focal point at a different position on the axis in the image space than the rays which are incident near the margin of the system, or points between.

If the paraxial (region near the axis) focus of the condensers is placed in the gate or in the lens, it is easy to see that the rays from the margin are likely to miss the projection lens, thus wasting in severe cases some of the periphery of the condensers. On the other hand,

if the primary thought is given to the placement of the peripheral marginal or zonal image, the paraxial image may fall too far out of line to be effective and cause intolerable lack of uniformity.

At its worst, spherical aberration with point sources produces an indeterminate region along the axis through which the source is imaged by the various zones of the system, together with unevenness of illumination and waste of useful light.

The same objections apply even more cogently to sources of finite size. Each point of the image is afflicted, and instead of a clear-cut, well-defined image it is either sharp with a large amount of general haze spread far outside the boundaries, or very fuzzy and ill-defined with poor evenness of illumination. In either case, a limit of utility is soon reached.

Spherical aberration is a function of the aperture of a system, increasing rapidly as it becomes greater. It is this spherical aberration which sets a limit to the solid angle of the collected cone of flux in a condenser, for always the system must be usable.

Spherical Surface Limitations

Spherical surfaces cannot deliver efficiently the quality and quantity of flux required by modern objectives, so resort is had to those surfaces which will permit higher solid angles and better definition of the source in motion picture projection with fast lenses.

A single spherical surface, and in general a simple system of such surfaces, acts as though it possessed too much refractive power toward its margins, or too little close to the axis. This might be remedied by the expedient of diminishing the curvature of the zones in just sufficient amounts to compensate the excess power. Mathematically, this is easy to do, the surfaces required in the general case having been worked out by René Descartes some 350 years ago.

These surfaces are in general not practical or economical, and as far as the practicing optical engineer is concerned are but curiosities, with the ex-

(Continued on page 27)

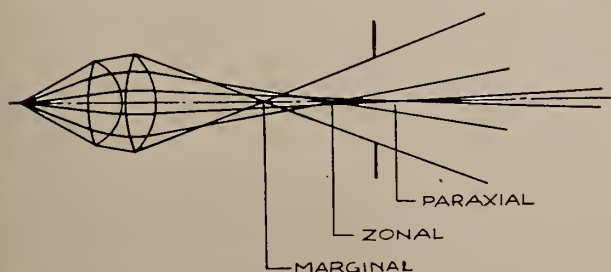


FIG. 7. Spherical correction. This illustrated simple under-correction wherein the marginal and zonal foci are closer to the lens than the paraxial.

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"THERE'S A BRANCH NEAR YOU"

Water-Cooling Projection Arcs

By MERLE H. CHAMBERLIN

Photos by LEO MOORE, 1A. Local 165

Chief Projectionist, Metro-Goldwyn-Mayer Studios, Culver City, California



WHEREVER projectionists gather discussions ensue and opinions seem to vary as to the benefits, both economic and visual, to be gained from water-cooling the carbons in projection arc lamps. Both sides of the question have ardent proponents. The appended comments stem from our experiences with water-cooling at the M-G-M studio.

It should be borne in mind that to us quality is a prime factor in influencing any decision we make on either equipments or procedures, with exhaustive practical tests being performed on all equipments submitted for prospective installation in our projection department. Since our plant is the source of much product you readers are "selling" through projection, we maintain maximum best results on our studio screens at all times.

Our first attempts at water-cooling a projection arc occurred about 1931. For process projection (rear transparency) we were operating our arc lamps far above the amperage level designated as practical by the manufacturer. Consequently, we were burning out parts just about as fast as we could install them. We were also re-photographing a "halo" or flare which originated with the red-hot positive baffle plate.

Early Cooling Setups

We tried several methods of cooling the area around the arc, finally installing a circulatory water system. The water traveled through a hollow baffle plate, around the brushes, through a radiator atop the projection room and then back through the circuit.

This installation resulted in several advantages. First, from the quality standpoint, we eliminated all flare, our arc burned more efficiently and actually seemed to "clean up" our picture. Second, from the economic standpoint, we reduced drastically our parts replacement problem. Consequently, all of our process projection lamps are now water-cooled and are never operated without water running through the system.

During the past 15 years several variations of water-coolers have appeared on the market. Some have been successful, others decidedly amateurish. Prior to the last six months all of these water-coolers have been designed for high-amperage installations. The majority of cooling systems seen by the writer have

used the hollow baffle plate water chamber as a basic cooling agent.

One cooler, custom built for high-amperage drive-in theatres, seems to merit more than passing interest. This adaptation is installed on a pair of Peerless Hy-Candescent lamps in the El Rancho drive-in at San Diego, California. This cooler employs the "water coursing" method. Instead of a hollow baffle plate water chamber, a scientifically designed series of water channels is employed. This method appears to be the most practical one yet demonstrated.

A series of tests were undertaken a few days prior to the opening of El Rancho on January 28 last. Film, both color and black-and-white, was viewed, and the clear white light was projected with and without the cooler installed. In addition to observing a "cleaner" picture, the writer took readings of the white light.

Regarding these measurements, it must be pointed out that the only value of the meter readings was to determine relative efficiency with and without the cooler. Due to the fact that the final coat of paint was not yet on the screen, ultimate illumination could not be determined. Test data follow:

Picture Size: 55 feet.
Throw: 247 feet.
Lens: 3¾-inch Super Cinephor.
Carbons: 13.6-mm super high pulling 180 amperes.

Typical installation of the Huff Electric Water Cooler in a Peerless Mognarc projection lamp.



Lamps: Peerless Hy-Candescent with Huff coolers (water course radiation type).

Screen: Plaster (paint job not finished).

Measuring Distance: 165 feet from screen with a G. E. brightness meter.

Weather: Overcast, high fog.

	NORMAL	WITH COOLER
Foot-lamberts:	6.75	7.25

During the past six months several experimental models designed for water-cooling Suprex type projection lamps have appeared. The extent of practicability and necessity for cooling this type lamp has been the topic of much controversy. Final models are offered as being complete and several demonstrations have been given. Such a demonstration was witnessed at the 900-seat Bundy Theatre in Los Angeles on February 3 last. The following light readings were taken by the writer:

Picture Size: 22 feet
Lens: 4-inch Super Cinephor
Lamps: Peerless Magnarcs with Huff Suprex Cooler.

Measurements in foot-candles at five positions on the screen (incident light) were taken with a Weston Model 603 illumination meter. Test data follow:

WITHOUT COOLER				
7- & 8-mm Carbons 60 amps.				
7.5	10	12.5	10	7.5
WITH COOLER				
6- & 7-mm Carbons 50 amps.				
11	13.5	14.5	13.5	11

After analyzing these measurements we are of the opinion that water-cooling presents an entirely new possibility. Viewing the picture at the theatre showed us an obvious increase in quality with the cooler. We not only saw more light but also a flatter field of light. These observations were supported by our meter readings. When economic factors are considered (more light with less current and smaller carbons) we have still another argument in favor of water-cooling.

The technical explanation of what actually occurs at the arc as a result of water-cooling is obvious. With all but the actual tip of the carbon being cooled a wider crater is permitted to form with-

out chipping or penciling. This wider crater (in some cases up to 2 mm) affords a greater field source to the reflector, thereby filling the mirror with more light and resulting in a brighter and flatter field on the screen.

In spite of any previously formed opinions regarding the particability of Suprex water-cooling (the writer admits that previously he was definitely opinionated on the "anti" side) it now appears that through the medium of water-cooling the basic efficiency of all types of present projection arc lamps can be enhanced.

Drive-in cooler installations differ from those made at regular theatres. At El Rancho the system comprises a self-contained unit of coolers, pump and radiator which is positioned outside the projection room. At regular enclosed theatres, like the Bundy previously mentioned, hookup is made to the regular water supply, connection being effected on the intake under the wash bowl in the projection room.

The rate of flow of the water is the same in both cases: approximately one pint per minute, which amount is sufficient to guard against more than a 20-degree rise in its temperature.

[NOTE: Complete details anent the Huff Electric Water Cooler mentioned herein may be obtained from Huff's Mfg. Co., 659 W. Jefferson Blvd., Los Angeles 7, Calif.]

Huff Electric Water Cooler installed on a Peerless Hy-Candescent arc lamp viewed from the operating side.



Seek Chicago Acetate Law Repeal

The Chicago city council is considering amending an ordinance so as to permit retailers, churches, schools and individuals to store more than 2000 feet of safety (acetate) film without the necessity for obtaining a special license and abiding by special restrictions in handling such stock. A parallel court action now in progress is based on the contention that such restrictions should apply only to nitrite film.

Toxicity of Carbon Arc Gases

By T. A. FILIPI

Department of Health, State of Nebraska

*Observations by a worker in the field of industrial hygiene anent the article of the same title by Dr. Leroy La Towsky which appeared herein last month.**

IN THE case of poisoning from fumes from the carbon arc, as with many other public health problems, there are two sorts of things necessary for the solution of the problem involved. One of these is the securing through experimentation and observation of the necessary scientific knowledge; the other—the part that so frequently lags in the case of public health problems—is the application of that knowledge to the solution of the problem.

Dr. La Towsky's paper deals especially with the scientific part. That nitrogen is "fixed" by the electric arc and that the resulting compounds are toxic, has long been known. That an important industrial hygiene problem in connection with the use of the electric arc existed was recognized by the Nebraska State Labor Department in 1935, and some experiments to illustrate the necessity of adequate ventilation in motion picture projection rooms was done by the Nebraska Health Department.

Health Department Experiments

Personnel of the Department were shown experiments in which guinea pigs were exposed to fumes from the arc, and thereby the personnel was impressed with the importance of ventilation in connection with the use of the arc. At the conclusion of a series of such experiments a memo for the Department records was prepared by L. O. Vose, director of the State Laboratories. This memo, in part, follows:

... An apparatus was arranged to collect the fumes from above the carbon arc and cause them to pass through an enclosed glass chamber at a regular uniform rate. Guinea pigs exposed to such fumes in this chamber showed restlessness and irritation beginning a few minutes after exposure had started and progressing with increased intensity, the animals staggering around until at the end of 45 minutes to 1 hour the animals so treated were unable to stand any longer. They were then removed from the chamber, and a rapid recovery of the animals to apparently normal state followed.

An absorption train designed to absorb nitric oxide but to permit the passage of carbon monoxide was introduced between the carbon arc and the glass chamber. Tests for nitrates showed that this absorption train did not remove all of the nitric oxide gases

but indicated that the amount of such gases reaching the chamber were considerably reduced.

Guinea pigs exposed to the fumes in this chamber following such absorption showed no signs of irritation or toxicity at the end of 1½ and 3 hours' exposure respectively.

Spectroscopic Blood Test Results

Spectroscopic examination of the bloods taken from these two series of experiments were made immediately following the experiment. The spectroscopic appearance of the blood from the animal exposed to the unaltered fumes showed an abnormal spectrum identical in appearance with the spectrum of some blood to which had been added a small amount of sodium nitrite.

Spectrum of the blood from the other series showed identical with normal blood. No spectroscopic evidence of carbon monoxide poisoning could be found in the blood of animal so exposed.

The fact that nitrogen oxides are produced by the arc and that these oxides are toxic is not new knowledge. However, these brief experiments illustrate the importance of adequate ventilation to prevent exposure of workers to the fumes from the arc. The experiments conducted showed definite evidence of considerable toxicity resulting from the nitric oxides, but showed no evidence of other poisonous substances in the fumes from the carbon arc light.

La Towsky's experiments took up the scientific problem at about this stage and amplified and extended the scientific knowledge in an able manner. Especially interesting is the fact that certain species of animals were found to be much more sensitive to arc fume than were other species—a fact suggesting that there might be considerable differences in individual susceptibility among humans.

The work he has started on the composition and possible harmful properties of the dust from the arc should be completed and should be extended to include the various types of therapeutic carbons being used.

I understand that these tests as well as others of this nature have been conducted with ordinary atmosphere as present in the respective laboratories—probably atmospheres low in humidity and in carbon dioxide. These experiments found no evidence of carbon monoxide formation. The atmosphere of a small projection room might be considerably different, containing higher

(Continued on page 30)

* "Toxicity of Carbon Arc Gases," IP for February 1948, p. 10.



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Wide Variance in Screen Light Levels

SMPE Screen Brightness Committee Reveals Lax Field Conditions

Introductory Statement to Committee Report

THE question of screen brightness became one of paramount importance shortly after the advent of sound motion pictures at the time processing control was being greatly improved and the industry was becoming uncomfortably aware of the complicated relations between print density, contrast, screen size, brightness, reflectivity, and auditorium illumination as related to audience viewing comfort. Numerous SMPE papers and committee reports since 1931 have contributed greatly to the industry's understanding of the problem and represent most of the accumulated knowledge of the subject. This information was consulted prior to adoption of the present standard screen brightness level of 10 foot-lamberts in May, 1944.

Positive Evaluation Desired

The industry is attempting seriously to define audience viewing comfort in a positive way, so that at least a few of the many basic variables can be specified and, where possible, standardized. Among the factors that it seems desirable to specify are print density, print contrast, projection-light intensity and spectral quality, light distribution, screen brightness, and auditorium illumination.

In addition, these are factors over which there is a reasonably precise degree of control and it is convenient that they lend themselves readily to measurement and that scientific language has provided the necessary nomenclature as well as accompanying units of measure. Therefore, specifying these factors is relatively simple when compared with defining the many intangibles that characterize visual enjoyment of motion pictures.

Since it is possible to make definite observations, record what is observed and also to control several elements of the system, almost any given set of viewing conditions can be reproduced later for further study or investigation. It was for this reason that the committee decided to consider only these controllable ele-

ments in the present program, which have been restricted in scope in order to hold the demands on the part of individual committee members to a minimum and to establish goals that the committee might reach in some reasonable period of time.

Long-Range Program Set

The three following items make up the Screen-Brightness Committee's long-range program. The first is the one with which the committee is currently occupied.

1. Determine present theater practice for screen illumination, screen reflectivity, and screen brightness.

2. Evaluate present use of projection equipment and screens from the standpoint of over-all efficiency.

- 3 From the data and experience gained in the above work, prepare specifications for intensity and brightness-measuring instruments; outline a standard procedure to be used in making these measurements and then establish a new standard for screen-brightness level, specifying desirable levels of auditorium illumination, brightness distribution, etc.

In order to determine present practice in a reliable way, the committee feels it is necessary first to agree on particular measuring instruments and the procedure for their use; then make measurements in enough of the country's 19,000 theaters for the results to be conclusive.

A combination photoelectric instrument to read such extremely low brightness levels will require a long time for development, so the committee felt it undesirable to wait and further delay its work, because the need for the survey information is so urgent. Therefore, to get things started, the first item on the agenda was divided into several parts, in order that more than one phase of the work might proceed concurrently.

[NOTE: An exposition of the committee's program accompanies this introductory statement.]

with the preliminary survey limited to 18 theaters in the East and Middle West.

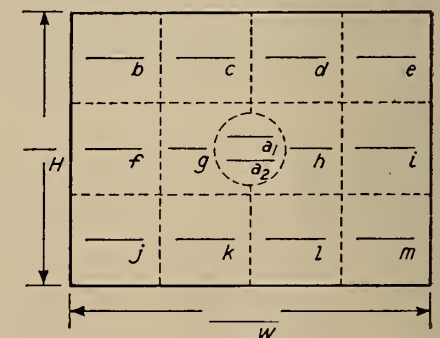
It was decided that in order to obtain complete data for over-all usefulness, it would be necessary to measure the light intensity on the screen, the brightness of the screen, and to record some of the physical dimensions of the theater affecting projection, and some of the details regarding projection equipment.

Determination of Data

The measurement of screen illumination was made with each projector separately, with operation entirely normal except for the absence of film. The light intensity was measured at various points on the screen to determine the distribution of the intensity over the surface and also to be able to compute the total lumens incident on the screen.

Two different methods of doing this were employed. The one involved a division of the screen area into 12 equal areas with the light intensity being measured at the center of each one of these zones. Fig. 1 describes this 12-point method and shows the form of the data sheet used to record the measurements.

The other method consisted in measuring the light intensity at the center of the screen, at the upper left- and lower right-hand corners, and at the



Read intensity on the screen in foot-candles at a_1 first, then b thru m in sequence, concluding with a_2 at the center to check intensity changes. Points b, c, d , etc., are in the center of their dotted areas.

SCREEN AREA

$$\text{AREA IN SQUARE FEET} = H \times W \quad = (1)$$

SCREEN LUMEN CALCULATION

$$\text{AVERAGE INTENSITY} = \frac{\text{TOTAL } b \text{ THRU } m}{12} \quad = (2)$$

$$\text{SCREEN LUMENS} = (1) \times (2) \quad =$$

FIG. 1. Sample data sheet for determining screen illumination by the 12-point method. Use separate sheet of this and other samples for each projector.

THE committee has actively embarked on a preliminary survey of a number representative theatres to determine practical methods for measuring brightness and illumination of motion picture screens. Equipment and test procedures immediately available were used to expedite the initial task of investigating in a few theatres proper measuring techniques, and of determining present brightness and intensity levels in theaters.

The immediate purpose of the program

is to gain enough experience concerning specific test procedures to be able to recommend techniques to be used in a more complete survey aimed at obtaining basic information regarding screen illumination and brightness practice in the entire industry. With information available on test methods and present theater practice, it will be possible for the industry and the committee to utilize theater equipment most effectively to achieve desirable standards of screen brightness.

This progress report deals specifically

† J. Soc. Mot. Pict. Eng., March, 1948.

SMPE Screen Brightness Program

INDICATIVE of the scope and complexity of the problem of evolving screen brightness standards for thousands of theatres having diverse architectural features, screen sizes, projection equipment and even varying auditorium atmospheric conditions is the appended list of work already completed, in hand, and scheduled for the future by the Society of Motion Picture Engineers through its Screen Brightness and other committees. Data on any phase of this work will be most welcome to the SMPE. Herewith the project list:

1. Conduct a preliminary survey to prove practicability of procedures and value of results. (This has been done and is the subject of the report of the Screen Brightness Committee).
2. Develop new brightness meters. (Two new instruments are now in the process of development).
3. Prepare a simplified survey procedure. (The Committee's current recommended procedure is described in the accompanying report).
4. Conduct a complete theatre survey using new instruments and the approved procedures that have grown out of the preliminary survey.

Several questions which merit further consideration but are of such a nature that they must be held for a later date, were published in a Screen Brightness Committee report on page 127. of the August, 1936. *Journal*. In addition to those mentioned above, they are substantially as follows:

1. What correlation is there between best print contrast and screen brightness?
2. What effect does the brightness standard have upon the standard of release print quality? Shall release prints of different contrasts be made available to theatres operating at different screen brightness levels?
3. Is high-light density, average density, shadow density, density of the area of principal interest, or a combination of these factors the thing that determines preferred brightness?
4. What possibilities are there for improvement in projection optics, pull-down efficiency, and source brilliance?
5. What is the effect of color of the light source, color of the screen, and color of the print upon the desired brightness?
6. What proportion of moviegoers see pictures on screens greater than 20 feet, 25 feet, 30 feet? Statistical data on theatre sizes, screen sizes, projection equipment, and attendance figures are needed by the Committee. A complete paper of this kind would be valuable also in connection with other problems confronting the Society.
7. What factors determine screen width? Would it not be better, for instance, to use a 25-foot screen at 9 foot-lamberts than a 30-foot screen at 7 foot-lamberts? The data of visual acuity tell us that the picture detail visible at great viewing distances should not suffer.
8. What is the effect of auditorium illumination upon the required brightness level?
9. What is the effect of the visual angle or the screen size upon this value?

right and left edges midway between the top and bottom of the screen. The 5-point method is illustrated in Fig. 2.

Methods, Equipment Used in Tests

The committee decided to use two methods in this preliminary survey to determine whether the method of 12 equal areas could be supplanted with no loss in accuracy by a quicker 5-point measurement.

The equipment used to determine screen-light intensity consisted of a "photonic" cell corrected for eye sensitivity, and a micro-ammeter, with the cell and meter calibrated in foot-candles. The cell was placed parallel to the screen facing the projector, and the determination of incident foot-candles was made from the meter calibration at the various spots discussed and illustrated on the data sheets.

A telescoping pole capable of being extended 20 feet was used to advantage to raise the cell to the proper position on the screen. A tripod mounting equipped with casters facilitated the

movement of the telescoping pole across the theater stage.

Screen brightness was determined at the time screen-intensity measurements were being made. The brightness measurements were made at the center of the screen and at the upper left- and lower right-hand corners from four positions in the theater.

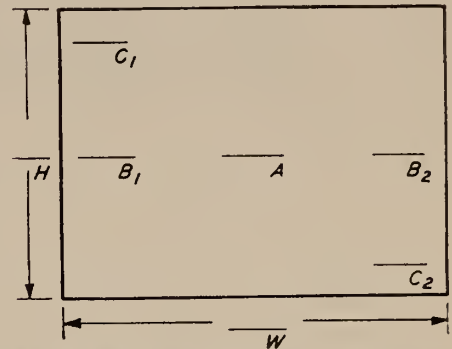
Theatre Measurement Positions

The four positions as shown on the data sheet shown in Fig. 3 were in the center of the theater $3\frac{1}{2}$ screen-widths back of the screen, in the center of the first row of seats, the extreme left seat in the first row, and the seat in the middle of the row farthest away from the screen in the highest balcony, if there was one. A Luckiesh-Taylor meter was employed to determine the screen brightness.

Since only visual types of meters were immediately available, the committee decided to utilize this type in the survey to permit concrete data to be obtained without too much delay. However, the

committee intends to stimulate the development of physical brightness-measuring meters, since it is felt that the visual type is not generally satisfactory

(Continued on page 20)



Read intensity on the screen in foot-candles at the five positions indicated. C_1 and C_2 are located $1/20$ of H from edges and $1/20$ of W from sides. B_1 and B_2 are on the horizontal center and $1/20$ of W from sides. A is in the exact center.

SCREEN AREA

$$\text{AREA IN SQUARE FEET} = H \times W = \quad (1)$$

SCREEN LIGHT INTENSITY AND DISTRIBUTION

$$\text{RATIO } \frac{B_1 + B_2}{2} \times \frac{1}{A} =$$

$$\text{RATIO } \frac{C_1 + C_2}{2} \times \frac{1}{A} =$$

SCREEN LUMEN CALCULATION

$$A \times 2 =$$

$$B_1 + B_2 =$$

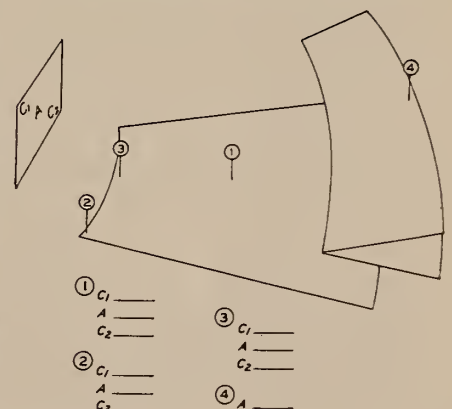
$$\frac{C_1 + C_2}{2} =$$

$$\text{TOTAL} =$$

$$\text{WEIGHTED AVG.} = \frac{\text{TOTAL}}{5} = \quad (2)$$

$$\text{SCREEN LUMENS} = (1) \times (2) =$$

FIG. 2. Data sheet for determining screen illumination by the 5-point method.



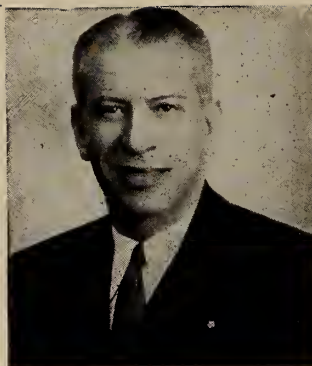
POSITIONS:

- (1) Center, $3\frac{1}{2}$ screen widths back from screen
- (2) Left front corner seat
- (3) First row center
- (4) Balcony top row center

Read brightness at 3 places on the screen from auditorium positions 1, 2 and 3, but only the center from position 4

FIG. 3. Data sheet showing location of auditorium seating positions for brightness measurement.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE attention of all IA Local Unions is focused upon Local 488, Harrisburg, Penna., in its long drawn out negotiations with the theatres. The bone of contention here is the request of the Local for double pay for Sunday work. Until four or five months ago movie theatres in Harrisburg were closed on Sundays, and existing contracts with the union cover work on weekdays only.

It is a peculiar thing about this motion picture industry that, come a Sunday or a holiday, the exhibitor loses no time in boosting the price of admission to his theatre; but when extra pay for the projectionist is suggested he will fight tooth and nail against it. According to his way of reasoning, holidays begin and end at the box-office.

Although practically every other industry recognizes that men and women should receive extra compensation for working on Sundays and holidays, show business still insists upon adhering to practices that have long since been discarded by labor-management groups throughout the country.

We are confident that Larry Katz and Sam Rubin, president and business agent, respectively, of Local 488, will be successful in this fight of such importance to all IA men.

- His broken toe having mended, George Raywood, business agent of Local 316, Miami, Fla., is hitting on all cylinders again.

- John B. Fitzgerald, International Representative, attended the recent Shea Circuit Convention in Cleveland. His address to the delegates, touching upon the harmonious relations existing between the Circuit and IA officials, was warmly received.

- A shining example of good labor-management relations is that existing between Projectionists' Local 225, Atlanta, Ga., and the exhibitors. The man largely responsible for this relationship is Jake Pries, business agent of the Local who, in addition to his official duties, operates a projection machine at the Fox Theatre in Atlanta.

In a recent newspaper interview Pries

stated that the spirit of cooperation existing between Local 225 and the theatre interests is due to a sound and sensible approach to the problems of the industry by all parties concerned. "All I did," said Pries, "was to get the boys to put their cards on the table. Instead of the former dissatisfaction and unrest we now have real understanding. It is a pleasure and a privilege to do business with the men who run the theatres here."

Representatives of the exhibitors expressed similar thoughts and were equally proud of the friendly relations between the two groups.

- The members of the New York State Legislature (206 of 'em) voted *themselves* a pay increase of \$2,500 per year. Not bad work, if you can get it, particularly when you don't have to punch a time clock and can report for work whenever it suits your convenience.

- Ralph Grimes, secretary of Local 224, Washington, D. C., has been appointed to the Motion Picture Operators' Examining Board for the District of Columbia.

• **The 30th Bi-Ennial Convention of the IATSE will be held at the Cleveland Auditorium, Cleveland, Ohio, the week beginning August 16 next.**

- The 44th anniversary party of Local 105, London, Ont., Canada was recently celebrated in conjunction with the installation of the newly-elected officers. Newt Wallis, retiring president, who was chairman and toastmaster of the evening, presided at the obligation of the incoming officers.

- Mike Mungovan, popular business agent of Rochester Local 25 and vice-president of the New York State Federation of Labor, was elected 1st vice-president of the Central Trades and Labor Council of Rochester. For his bread and butter Mike holds the job of carpenter at Loew's Theatre.

- Another old-timer has passed on.

Adolph (Dad) Wittman, member of St. Louis Local 143 for over 35 years, died last month after a lingering illness. He is survived by his widow and a daughter.

- We are happy to report that Seth E. Barnes, member of Wichita, Kans. Local 414 and chief projectionist of the Fox-Orpheum Theatre, is well on the road to a complete recovery from the three major operations he underwent during the past year. Barnes expects to resume his duties at the theatre in the very near future.

- Tom Loy, in charge of public relations for the IA, became the daddy of a seven-pound boy, Tom, Jr. We plan to call at the General Office one of these days to collect the customary cigar.

- President Walsh was the guest of honor at a dinner tendered by the West Coast studio Locals. Many IA officials were present, including Roy Brewer, who was master of ceremonies, Carl Cooper, Bill Barrett, and officers of the various studio Locals.

- Random notes from Local 623, West Palm Beach, Fla.: R. H. Johnson, president of the Local, made his fourth trip to the altar on February 22. (Which puts us in mind of the old adage—"If at first you don't succeed, try, try again.") . . . C. W. Crow, business agent, celebrated his 18th wedding anniversary on February 27. . . . James Bursey took a little jaunt down to Havana, Cuba (to brush up on the Conga, we presume). . . . R. H. Johnson, C. W. Crow and John Cummings (secretary of the Local) attended the banquet given in Miami recently in honor of General Secretary-Treasurer Wm. P. Raoul. . . . Ira Kit Carson, Local 145, Gary, Ind., and Davey Day, Local 110, Chicago, Ill., were among the out-of-town visitors to Local 623 headquarters.

- We were glad to learn that Gus Demery, long-time member of Toronto Local 173, has checked out of the Toronto General Hospital and is now recuperating from his recent illness. Gus is very well-known in Canadian projection circles and

his many friends will be glad to know he is well on the road to recovery.

• Old "Virus X" knocked the heck out of Morris Rotker, president of the 25-30 Club, and kept him away from the last meeting. Cecil R. Wood, Sr., vice-president of the Club, ably presided in Rotker's absence.

Allen G. Smith, recently appointed manager for National Theatre Supply's New York branch, attended the meeting and received a warm welcome from the old-timers. Incidentally, although Walter Bemis, former president of Local 384, Hudson County, N. J., celebrated his 70th birthday not so long ago, he seldom fails to attend a Club meeting. He looks forward with great anticipation to these gatherings and his cheery presence is a decided asset to the sessions.

• Our old friend (everybody's friend, in fact) and confederate in the unending battle for high projection standards, P. A.



P. A. McGuire

McGuire, of International Projector Corp., called the other day and lightened the day's work with his typical Celtic warm friendliness and humor. One sharp observation by Mac was that while it is entirely fitting that a craft or a trade, or any group, keep a weather eye peeled for the future, particularly in terms of technical developments that might affect its interests, this interest in the future is not in itself any reason for shirking the job immediately in hand and not trying to constantly improve the tools and techniques of the present.

We knew, of course, that this was Mac's way of giving a new twist to his pet slogan that "better projection pays"—today and tomorrow.

• Charges of feather-bedding and other alleged violations of the Taft-Hartley Act brought by the Children's Museum of Washington, D. C. against Local 22 (stagehands), were dismissed last month by the Baltimore Regional office of the National Labor Relations Board. The NLRB decision held that there was insufficient evidence of violation to warrant further proceedings and dismissed the action.

The Museum, which puts on eight shows yearly at George Washington University's Listner Auditorium, charged that it had been forced by the Local to use a stage crew of nine men to do work which could be performed by three high school boys. It further claimed that the Local sought to impose a closed shop and to precipitate jurisdictional strife.

Denying all charges, Local 22 con-

tended that the stage employees were paid only for services rendered and pointed out that they were employed by the University and had no relationship to the Museum. The University, by reason of past experience, stated the Local, was well satisfied with the services of skilled workers and did not want to entrust its equipment to school boys.

• We are happy to report that Pat Offer, former business agent of Hollywood Local 165, has fully recovered from his recent ailment and is back on the job as chief projectionist for Monogram Studios. Pat informed us that he does not plan to attend this year's IA Convention.

• Bert Sanford, theatrical sales manager for Altec, was appointed vice-chairman of the motion picture committee for the 1948 Appeal of the New York Catholic Charities. A goal of \$2,500,000 is the aim of the Appeal, with the fund raising campaign beginning April 18 and continuing through April 28.

• His long record of excellent service as secretary-treasurer of Local 506, Anniston, Ala., has made Geo. McGuire an indispensable factor in the smooth functioning of that organization. That, at least, is the opinion of the membership who recently re-elected McGuire to office for the 22nd consecutive year.

25 Years Ago—March 1923

• Ed Tinney resigned as 5th I. A. vice-president and subsequently was appointed an International Representative by President Shay. . . . Bill Elliott, Cincinnati Local 5, was elected by the General Executive Board to fill out Tinney's unexpired term as 5th vice-president. . . . A bill legalizing Sunday performances was opposed by Actors' Equity Association. . . . The Untermeyer proposal to license labor unions in the State of New York was defeated in the State Senate 50 to 0. . . . Lou Krouse pinch-hit for ailing Bill McKinnon, manager of the adjustment department. . . . Report of IA Representatives' field activities: Charlie Crickmore trouble-shooting in Cheyenne, Wyo. and westward; Steve Newman settling difficulties in Oakland, Calif.; Harry Sherman adjusting trouble between Local 130, Altoona, Penna. and theatre owner; Joe Magnolia investigating internal dissension in Utica, N. Y. Local. . . . Fred Raoul ironing out difficulties in Southern territory. . . . General Office issued a warning against one falsely representing himself to be private secretary to President Shay. . . . Irving Fisher, financial writer for the *New York American*, reported that the dollar was worth only 63c. . . . Senator Walsh of Massachusetts declared that living costs had increased from 10 to 30%.

I. A. ELECTIONS

LOCAL 105, LONDON, ONT., CANADA

J. E. C. Saunders, *pres.*; Alex McLeish, *vice-pres.*; Cliff Mills, *sec.-treas.*; Wm. Hewitt, *rec.-sec.*; Fred Hewitt, *bus. rep.* (stage hands); Sid Bradford, *bus. rep.* (projectionists); W. O'Rourke, *sgt.-at-arms*; H. Allaster, R. Courtney, Wm. Courtney, *trustees*; F. Cripps, J. McNally, *auditors*; J. M. McLeish, Wm. Hewitt, G. N. Wallis, *exec. board*; S. Bradford, C. Mills, S. Shaw, *exam. board*; Fred Hewitt, *del. I. A. Convention*.

LOCAL 110, CHICAGO, ILL.

James J. Gorman, *pres.*; Frank Galluzzo, *vice-pres.*; Clarence A. Jalas, *sec.-treas.*; Eugene Atkinson, *bus. mgr.*; Sam Klugman, Chas. B. McNeil, Art Tuchman, Charles Funk, *exec. board*; Claude Holmes, George Karg, Edward H. Schulze (chairman), *trustees*; Julius Dickstein, *sgt.-at-arms*; Eugene Atkinson, James J. Gorman, Clarence Jalas, Joe Rossberger, Wm. Campbell, Art Tuchman, Sam Klugman, and Howard Blackwood, *del. I. A. Convention*.

All officers were reelected by acclamation.

LOCAL 163, LOUISVILLE, KY.

Chester Demaree, *pres.*; August A. Ansbach, Sr., *vice-pres.*; W. Fane, Jr., *rec.-sec.*; Ed. F. Williams, *fin. sec.-treas.*; John P. Flaherty, *bus. rep.*; August A. Ansbach, Jr., *sgt.-at-arms*; Harry F. Petty, Robert L. Hulett, *del. Central Labor Union*; Percy W. Miller, *del. State Federation of Labor*; Percy W. Miller, Chester Demaree, *del. I. A. Convention*.

LOCAL 186, SPRINGFIELD, MASS.

Edward J. O'Connor, Jr., *pres.*; Granville G. Best, *vice-pres.*; Arthur J. Payette, *sec.-treas.*; Louis L. Williamson, *bus. rep.*; Joseph C. Rodriguez, *sgt.-at-arms*; Herbert Binns, Edward Whittle, John F. Gatelee, Jr., *exec. board*; Louis L. Williamson, Arthur J. Payette, *del. I. A. Convention*; Edward J. O'Connor, Jr., *alternate I. A. del.*

LOCAL 199, DETROIT, MICH.

Frank Kinsora, *pres.*; Gilbert E. Light, *vice-pres.*; Roy R. Ruben, *fin.-sec.*; Thos. O'Toole, *rec.-sec.*; Jos. A. Sullivan, *treas.*; Roger M. Kennedy, *bus. rep.*; Floyd Akins, *7th member*; Percy Huebner, *sgt.-at-arms*; Owen Blough, Walter Craig, William Esperti, *trustees*; Owen Blough, Fred Warendorp, Ray Doyle, *del. Detroit & Wayne Co. Federation of Labor*; Frank Kinsora, Gilbert E. Light, Art Potter, Roy R. Ruben, *del. I. A. Convention*.

LOCAL 230, DENVER, COLO.

James W. Dooley, *pres.*; Charles P. Weber, *vice-pres.*; R. E. Waller, *sec.*; Dan M. Kelly, *sec.-treas.*; R. E. Sturdevant, *bus. rep.*; Howard B. Banzhaf, *chairman, board of trustees*.

LOCAL 236, BIRMINGHAM, ALA.

J. C. Harper, Sr., *pres.*; Leo Nation, *vice-pres.*; J. F. Mankin, *sec.*; C. M. Trent, *treas.*; Ralph A. Root, Sr., *bus. rep.*; Thomas Wall, *sgt.-at-arms*; W. H. Mankin (chairman), J. T. Amberson, H. W. Gaston, *trustees*.

LOCAL 239, FAIRMONT, W. VA.

W. C. Davis, *pres.*; John Dudiak, *vice-pres.*; John W. Harless, *sec.*; Bruce Vandergrift, *treas.*; Huett Nestor, *bus. rep.*; Frank Urse, *sgt.-at-arms*; Charles Gibbs, Anthony Betonte, George Hunter, *trustees*.

(Continued on page 33)

WIDE VARIANCE IN SCREEN LIGHT LEVELS

(Continued from page 17)

because of the difficulty due to color differences in the photometer field.

Among the more important theater characteristics which were measured and noted were the screen width and height, the seating plan with relation to the screen—that is, the distance from the screen to first and last rows, the width of the theater at the first and the last row—and the seating capacity.

Data on projection equipment were also obtained and these included among other things the projection throw, projection angle, the type of lens, shutter, arc, and power supply. The data sheet used is shown in Fig. 4.

Interpretation of Data

The results obtained in the 18 theaters were representative of houses having screens in the range from 12 feet to 31 feet wide with seating capacities from 300 to 6200 seats and with projection throws from 65 to 207 feet at angles from 5 to 24 degrees.

It was particularly interesting to compare the results obtained on screen brightness with the 9- to 14 foot-lambert standard now in effect. After the brightness data were analyzed, one fact stood out: approximately 50% of the theaters had a screen brightness at or below the minimum recommended value.

Of the 40 projectors in the 18 theatres checked only 12.5% (5 projectors) exceeded the recommended maximum.

Of interest to the committee also, was the light-intensity distribution over the screen and the total lumens on the screen. The foot-candle intensity at the center of the screen in these 18 theaters varied from a minimum of 7 to a maximum of 30. Approximately one half of the projectors gave from 10.5 to 16.5 foot-candles.

Light Distribution Analysis

An analysis of the distribution of light intensity over the screen showed that about two thirds of the projectors provided 50 to 75% as much light at the sides as at the center. One projector provided only one third as much light at the side as at the center and in three cases the ratio was over 90%.

The ratio of corner-to-center light generally fell in the range 45 to 65%, although in one case it was as low as 25%, and at the other extreme ran as high as 75%.

The total luminous flux falling on the screens was calculated using both the 12-point and 5-point methods. The results show no significant difference between the two methods, the average ratio of all results being 1.00. Because of this finding

and the fact that the 5-point method is faster and simpler, the committee is inclined toward its use.

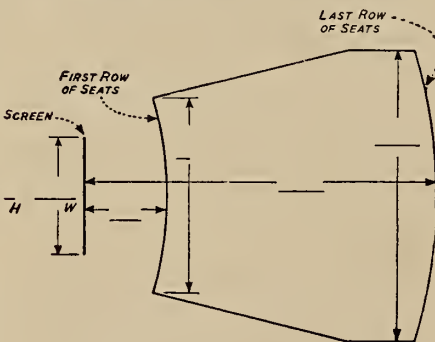
Estimates were also made of the screen lumens expected to be available on the basis of our knowledge of the equipment in use in each theater and the measurements recently published¹ on expected output of various types of projection systems.

Wide Range of Screen Lumens

Generally, it was found that the screen lumens obtained fell below the expected values. 17½% of the projectors obtained practically all the light to be expected from their equipment. On the other end of the scale, 7.5% were obtaining only 35 to 45% that estimated obtainable. About half of the cases resulted in from 35 to 75% and all of the light available.

The reason for these deficiencies were determined. However, it is felt that proper search would lead to corrections to minimize these differences.

With data available on light intensity on the center of the screen and brightness at the center, it was possible to calculate reflectivity for the matte screens



1. SEATING CAPACITY _____
2. HOW MANY BALCONIES _____

PROJECTION DATA:

1. Distance from aperture to center of screen _____
2. Projection angle _____
3. Arc lamp type _____
4. Positive carbon _____
5. Negative carbon _____
6. Arc amperes _____
7. Arc volts _____
8. Projection lens:
 - (a) f/ number _____
 - (b) Focal length _____
 - (c) Surface coated: Yes — No _____
9. Type of shutter _____
10. Draft glass type _____
11. Heat filter type _____
12. Projection port glass: Yes — No _____
13. Type of power supply _____
 - (a) Rating in amperes _____
 - (b) Rating in volts _____
 - (c) Operating voltage _____

encountered in the 18 theaters. The general average level of the reflectivity of the screens was approximately 70%.

Results Indicative, Not Conclusive

Accurate reflectivity figures in individual cases were limited by difficulties in obtaining good visual-brightness values with the visual-brightness meter. This undoubtedly is partly responsible for the extremely high values of reflectivity in two theaters and possibly some of the low values, though in this case deterioration is visualized as the major factor.

It is recognized, of course, that the results obtained in a preliminary survey of 18 theaters are not conclusive evidence of the experience to be found in the approximately 19,000 theaters in the country. Therefore, this progress report is *only indicative* rather than conclusive and must be followed by a more thorough examination on rather sound statistical grounds before any conclusions can be drawn regarding general practice today. Neither can the committee make definite recommendations yet concerning the technique to be used, particularly in the determination of screen brightness.

The committee believes now that a truly successful and most useful brightness meter for survey usage should be a physical measuring device rather than a visual photometer. At least two manufacturers are engaged in the development of such instruments and the committee will examine these units to determine their practicability.

More Extensive Tests Required

Although definite plans have not yet been formulated, it is the hope and intent of the committee that this work be continued more extensively to arrive at the objectives of specifying equipment and test methods for accurately measuring brightness and illumination on the screen and of determining present practice in the theaters. It is believed the industry will then be in a proper position to make the most effective utilization of available equipment and to maintain screen lighting in line with recommended practice.

¹R. J. Zavesky, C. J. Gertiser, and W. W. Lozier, "Screen Illumination With Carbon-arc Motion Picture Projection Systems," *J. Soc. Mot. Pict. Eng.*, vol. 48, p. 73; January, 1947.

What's on the Sheet Counts

Ticketed for the close attention of those who view the projection process as a purely "automatic" procedure is the following report on a picture to "Box-office" magazine:

HELDORADO (Republic)— . . . This was a good western (I suspect) but the print was so rotten that all we had was breaks, and the customers still are wondering what the film was all about.—*Annex Theatre, Anamoose, No. Dakota.*

It's the old story that if it isn't on the film, it can't be on the screen.

FIG. 4. Form for recording theatre data.

OUR gang has been particularly interested in the series of articles appearing in IP relative to projection room facilities in foreign countries, and especially in the many fine illustrations which enable the craft in the dear old U.S.A. to actually see what the "other fellow" is doing in terms of conformance to high projection standards.

You see, we here at Loew's think that we know something about this topic, since we operate theatres throughout the world — Egypt, Australia, India, Cuba, Switzerland, Belgium, and South Africa —and have especially strong representation in South America.

Fine Jobs Standard Everywhere

The presentation herein relative to our South American theatres reflects no special picking and choosing in order to make the best possible showing, because these S.A. theatres are in *every respect* typical of the type of installation in our theatres *everywhere*. We think that these projection setups are not only compar-

Loew's South American Way

By the Staff of Loew's Theatres
Projection and Sound Department

able with but are actually exact duplicates of the finest projection rooms here in the U. S. A.

We're begging no bouquets for Loew's

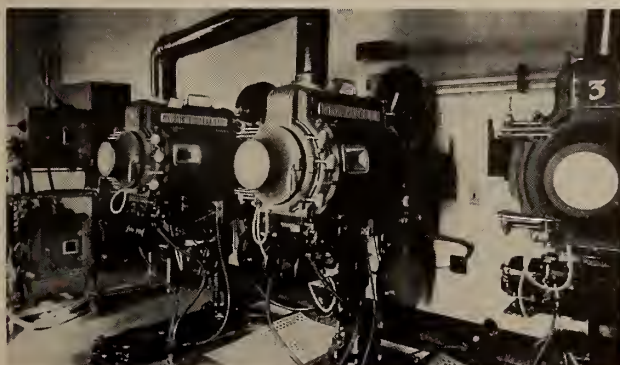
on the score of doing the job once and doing it right, because we believe that other circuit theatre projection departments adhere with equal fidelity to the principle that "better projection pays". Equipping a projection room in any part of the world should be based on the "selfish" premise of top-flight screen results and long-lived equipment.

The illustrations accompanying these few words are, we think, self-explanatory in conveying a very good idea of the layout of the room itself, the selection and placement of the major units, and the utilization of various accessories which help to put that final polish on even a good job.

One or two aspects of the installations pictured here warrant a bit of comment. For example, take a look at that projection room in the Metro Passeio in Rio de Janeiro. Spaciousness is the answer to every projection man's prayers, but the gods certainly were in a gleeful mood when the Metro Passeio projection space was allocated. No projectionist in

CINE METRO, LIMA, PERU

This closeup of front room wall evidences typical Loew planning and attention to detail.



METRO PASSEIO, RIO DE JANEIRO

This sleeper-jump from projectors to amplifier rack suggests possible future conversion of room to a skating rink.



METRO THEATRE, SANTIAGO, CHILE

Equipment includes 3 Super Simplex mechanisms, 5-point pedestals, Peerless Magnarc lamps, Brenkert F-7 stereo and effect projector, and Westrex Master sound system with Voice of Theatre horns. Note very unusual construction of exposed switchboard at left.



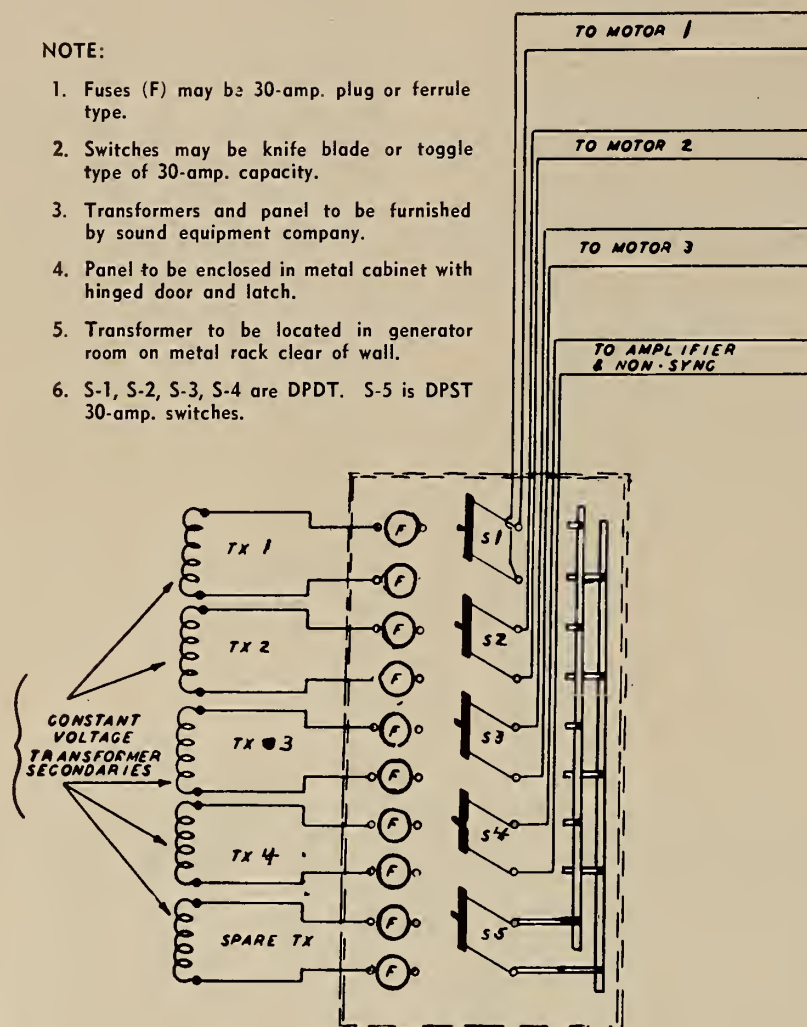
CINE METRO, SAO PAULO, BRAZIL

This spacious layout contains usual comprehensive Loew equipment: 3 Super Simplex heads, Super pedestals, HC-11 arc lamps, Brenkert F-7 stereo and effect projector, and Westrex Master sound system with Voice of Theatre speakers. Amplifier rack is wholly exposed.



NOTE:

1. Fuses (F) may be 30-amp. plug or ferrule type.
2. Switches may be knife blade or toggle type of 30-amp. capacity.
3. Transformers and panel to be furnished by sound equipment company.
4. Panel to be enclosed in metal cabinet with hinged door and latch.
5. Transformer to be located in generator room on metal rack clear of wall.
6. S-1, S-2, S-3, S-4 are DPDT. S-5 is DPST 30-amp. switches.



Wiring Plan of 115-Volt Sound Supply Panel (Secondary Service).

Hookup of special transformer installation in Loew's Metro Theatre, Valparaiso, to control excessive voltage variation with more than ample safety factor.

this room may rightfully complain that his work is "confining".

One installation of which we are especially proud is that in the Metro Theatre in Valparaiso, Chile (not shown in halftone here but a unit of which is reproduced in line on the following page). The feature that induces our chest-puffing is in addition to the concealed conduit work, third projector and emergency amplification setup always specified by Loew's.

Unique Transformer Installation

Power supply in Valparaiso is nominally 220 volts, but the large rolling mills operating in that city are the principal cause of the extreme voltage fluctuations ranging between 170 and 250 volts. Other theatres have attempted to combat this difficulty by installing ordinary 220- to 110-volts step-down transformers

and taking their chances with the voltage fluctuations.

But this was not good enough for Loew's. We wanted voltage regulation, of course, but we felt that one transformer did not provide sufficient emergency protection.

The solution finally decided upon was to install five separate Raytheon constant-voltage transformers, each of 1 kva capacity, so that each of the three drive motors has its own transformer, a fourth serves the amplifiers, and the fifth is available for emergency use in case of failure of any of the other four.

The accompanying line drawing shows just how this hookup was made. Ordinarily all switches are closed to the left, with the output of the spare transformer going into the copper buss. Should any of the other transformers fail, the corresponding switch is simply thrown to the

right, thus putting the load on the buss.

Another feature of this particular installation is the placement in the projection room of a special panel which enables the projectionist to test each high- and low-frequency unit separately. This is not entirely novel, being similar to the 200-A panel formerly supplied with Universal Base systems and to the TA-7354-A Control Cabinet that formed part of the original Mirrophonic systems. Because of this arrangement, the dividing network is also installed in the projection room, and 1¼-inch conduit is required for the A to B run.

Refinements ala the U. S. A.

This glimpse of how things are done projection-wise in other parts of the world should serve to dispel the notion of many American craftsmen that projection facilities abroad are akin to the hasty setting-up of outmoded projection equipment in a tent and with power and other facilities of the strictly portable type.

No indeed, because thanks to American ingenuity in the design and manufacture of exacting equipment plus the insistence of projection supervisors upon top-quality right down the line, the fellow in Timbuctoo enjoys the same quality projection as does Joe Doakes in any American de luxe theatre.

New Motiograph In-Car Speakers Now Being Distributed

Motiograph is now delivering its new in-car speaker equipment for drive-in theatres. The new junction boxes, made of two strong, bright aluminum castings, are completely rustproof and are designed so that they may remain installed in non-operating seasons, as all components are completely protected from the weather.

These junction boxes may be attached to pipe supports from 1½ to 3½ inches in diameter without special adapters or the necessity for threading the pipe. Solderless lugs in the boxes permit connection of speaker and feed cables in but a small fraction of the time required in less modern types. To obviate any damage to either speaker equipment or the patrons' automobiles, the boxes have a light that shines down on the base of the speaker standard base. This light also helps patrons to find their way back to their cars should they leave them for any reason.

Concessionaire's Light a Special Feature

A signal light to attract the concessionaire is standard equipment of the junction boxes, actuated by a switch on the in-car speaker. This signal light, it is believed, will materially aid concession sales and protect other patrons from unnecessary concession calls.

The Motiograph speaker, which uses a full 5-inch speaker unit, is offered in a choice of finishes including light blue baked enamel and a brushed cadmium finish. Recent improvements include fully rubber-plated hooks for car protection and treated speaker cones to resist all weather conditions.

Presenting: James L. Caddigan

SO WEARY are we of disputing the assertion by its natives that Boston is the seat of all culture that only sheer necessity induced by outstanding accomplishment could cause us to publicly humiliate ourselves by giving over this space as a tribute to a former citizen of that codfish community.

Still, if humble ourselves we must, we're glad that one of our own made the grade—our boy in this case being James L. Caddigan, recently appointed Manager of the Program Planning Division of the Du Mont television network, with headquarters in New York City (this should dispel the aroma of cod). James L. went too far, too fast for us, and we were chumps to let him get away.

While we had Jimmy, however, he did yeoman work for his craft in particular (Boston L. U. 182) and the industry in general by tackling and doing well a variety of technical, artistic and executive jobs in the motion picture field. Let's have a look at the numerous and diverse activities that Jimmy compressed into a comparatively short span of years.

The Storm Gathers Force

Projection he knows, of course, from all angles. For 15 years he was with Paramount Pictures during which time he was a newsreel cameraman, laboratory technician and, finally, manager of the Film Department for the New England District. As a cameraman Jimmy learned the ABC's of lenses and lighting, and also became familiar with various sound-on-film recording systems. As a lab technician he handled the complete processing from development of the negative through to the final newsreel print.

No cinch was Jimmy's next post as technical overseer for the New England District. Supervision of exchange technical operations, including all personnel and equipment therefor, and operating a preview theatre was only one phase of the job. All censorship contacts were handled by Jimmy (and you know Boston) as well as the cutting and re-editing of all Paramount pictures to comply with censorship requirements.

Along with this job Jimmy found time to handle the scripts, production, direction and photography of 35- and 16-mm films, in both color and black-and-white,

for such organizations as Boston Edison Co., Boston & Maine Railroad, and the Episcopal Diocese. He also served as technical advisor and film editor for The New Haven Railroad, Boston Fire Department, and the Committee on Public Safety. An incidental chore was the editing of Admiral Richard E. Byrd's lecture film on the Antarctic.

A Few Extra-Curricular Chores

In his *spare time* this Caddigan dynamo over a period of 17 years produced and directed musical revues for such backwoods outfits as Liberty Mutual Life Insurance Co., Bendix Aviation Corp., Boston Edison Co., and the U. S. Army and Navy. These productions, given under strictly pro standards, involved handling all details—lighting, costuming, scenery, props, etc.—of groups numbering up to 150.

Sandwiched in between the aforementioned light tasks were weekly articles of a semi-technical nature for "Paramount Service Manual," contributions to IP, and a raft of technical treatises for the magazine "Television".

Came World War II and Jimmy had thrust upon him the rank of Lt. Colonel assigned to the G2 section of the Army—this being, naturally, the Intelligence Section. The multiplicity and diversity of the chores performed by Jimmy while in uniform were such as to defy any detailed listing herein.

Radio Snooping Began Early

Jimmy's radio experience goes 'way back to the time when he served as a staff member of Station WTAT, the first radio outlet operated by the Boston Edison Co. and which was managed by Jim's father, John J. The transmitter was carried in a special truck and was set up at the location of each "remote," the use of connecting land lines not having then been devised.

Intensely interested in television since it first showed signs of being a potent factor in the entertainment world, Jimmy has maintained close direct contact through the years with the leading video companies and societies, in addition to following closely all tele proceedings before the Federal Communications Com-



James L. Caddigan, manager of Program Planning Division of Du Mont television network.

mission. He now serves on two sub-committees of the Television Industry Committee for both the forthcoming Democratic and Republican national conventions.

Considering the present confused status of the television industry—what with the pressing need for additional revenue and the acute problem attendant upon the extension and refinement of programming—it is apparent even to he who reads as he runs that the job of Program Manager is one that will challenge the best efforts of even so versatile a fellow as Caddigan.

Those who know Jimmy best as a personable, intelligent and imaginative square-shooter with a capacity for work rivalling that of a draught horse are betting that he turns in a typical Caddigan job—which means that it will attain a performance level comparable with the best in the video art.

Jimmy Caddigan didn't really leave us after all, because we all will be in there with him in spirit and pulling for him to do us the further honor of a big job well done.

Gregariousness in Extremis

Gregariousness as a peg on which to hang hopes for a continuation of the motion picture theatre as it is today was subjected to a heavy discount by David O. Selznick, outstanding independent producer, during a recent press conference in New York. Stating that he has "my own hunches" as to the influence of video on the film industry, Selznick added:

"However, I'm not one of those who feel that people are so gregarious that they'll leave the comfort of home, deserting the tele receiver, to go to a theatre where they may have to stand in line for sometime, be subjected to people stepping on their toes, and other inconveniences."

Selznick must read IP.



Du Mont tele station in New York City as last-minute pre-shooting checks are made. Note set, crew and multiple lighting and camera units. 'Cold' lights are rapidly gaining favor.

Passenger Train Sound Movies †

By JOHN G. BITEL

Comprehensive Service Corp., New York City

THE Chesapeake and Ohio Railway Co. decided, among other innovations, to present motion pictures as a form of relaxation to passengers on their de luxe passenger trains. The long backlog in the railroad-car building program has delayed the building of a special theatre car. Instead, it was decided to convert existing dining cars for the dual purpose of showing full-length feature films and still retain the use of the car for restaurant service.

The 60-foot, twin-unit diner car, "The George Washington," was selected and brought to the shops for necessary modifications. A major change had to be made to the 16 dining car tables. Retracting-lever mounts fastened to the under side of the table tops enabled the tables to fold in a vertical position against the side walls, clearing the floor area for occupancy. A total of 343 square feet of floor area provided for 50 chairs and a two-foot aisle for through traffic.

The remainder of the car space was utilized for housing air-conditioning equipment, food compartments, supply lockers, and a miniature projection room measuring, in inches, 45 wide and 70 long. The air-conditioning system was piped to operate inside the projection booth, in addition to an air duct and exhaust for the lamphouses and for the comfort of the projectionist.

Dual Projectors Used

For continuous performance, dual 16-mm projectors were installed. Small booth dimensions made it necessary to select a left- and a right-hand type of projection equipment. This combination occupied a minimum of space and enabled the projectionist to be centrally located, facing the operating side of each projector. The type of equipment selected was the RCA PG-201 and the Natco 3015 projectors. Professionally designed, both of these models lent themselves suitably for this particular installation.

Utilizing a.c. exclusively, the constant-speed motors maintain correct sound speed within 1% even when line-voltage change is 10%. The amplifier output level rated at 35 db proved ample for overcoming the extraneous noise level of the train in motion. Shock-mounting the amplifiers in their respective machines was necessary to prevent damage to the tubes and other components as a result of car vibration.

The projector mechanisms had to be rigidly mounted on solid bases, which in turn were welded to the car frame for absolute rigidity. Steady screen image was realized only when the aforementioned precaution was observed—even when riding over rough areas of road bed.

The same precautions had to be taken with the screen proper. Here the problem was two-fold, for the screen had to be rigid and still be easily demountable. The picture size was determined to clear the heads of persons occupying the first row of seats. The height clearance of 55 inches for a seated person allowed for a screen image 41 by 55 inches. A 4-inch lens with a throw of 48 feet gave the desired dimensions.

Fingertip Control Provided

Beaded screen fabric, cemented to a 3/4-inch plywood backing, properly masked and equipped with snap-hinge hardware, enabled quick mounting of the

screen in its proper place. Two rod braces fitting into keyhole sockets lock the screen rigidly in position.

Fingertip control of all switches, mounted in one unit between the two projectors, facilitates ease of operation of the equipment. Standard projection-room practice of changeover is accomplished by a changeover switch which automatically applies a glow voltage to the projection lamp on the incoming machine when the motor switch is tripped on the first cue. Full voltage is applied by tripping the light changeover switch on the final cue, at the same time cutting off the lamp current on the outgoing machine.

By adjusting proper glow voltage to the 750-watt projection lamps and operating within the time element of the two film changeover cues, a clean changeover of light is accomplished. Sound changeover is simultaneously accomplished by simply switching the outputs of the respective amplifiers and placing a dummy load across the outgoing machine.

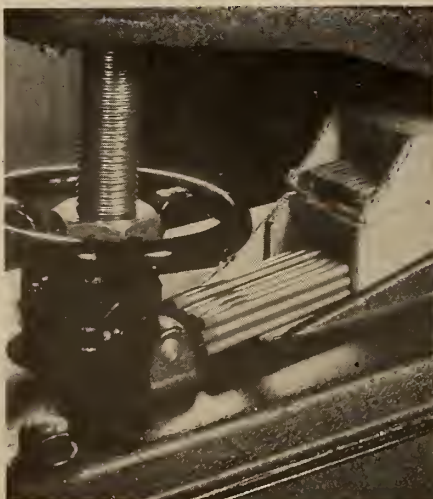
Preliminary tests with the existing
(Continued on page 32)

At Your Service

Assumedly most projectionists are like myself and get a big buzz out of seeing how the other fellow does things more efficiently and (s-h-h) easier. So, here are a couple of kinks which I think worthy of passing along.

The first relates to a method for keeping carbons handy. The projector bases are Simplex LL3's. I took a pair of carbon boxes and cut them by the trial-and-error method, finally arriving at the result shown in the accompanying photo. The negatives are 6 x 9, the positives 7 x 14. The negative box will hold 50 carbons, but the positive box will hold only 30. However, it may be possible to

Handy positioning of carbon containers on base.



Notched test film shown in use.

get 50 12-inch carbons in there on account of their fitting behind the tilting wheel.

I used a variation of the same idea on the old Universal bases, as a pair of 6- and 7-mm carbon boxes will just fit side by side in the lamphouse support.

A method for cleaning lint out of the fire trap without scratching the rollers is my second contribution. Take a piece of film, cut it down the middle, whack off the outside half of the sprocket holes and use in the manner shown in the photo. This gag also works well around the lateral guides and strippers. (Now, any of you guys having other "kinks," don't be selfish—give.)—DOUGLAS R. FRAZEE, Fox Auditorium Theatre, Marshall, Missouri.

† J. Soc. Mot. Pict. Eng., January 1948, p. 64.

PROJECTION ROOM HANDLING OF FILM PRINTS

(Continued from page 6)

celluloid surfaces increases the strength of the splice.

The splicer must be adjusted so that the stub is scraped to the precise required width. A transparent line across the film, caused by scraping too great a width, produces a click in the sound and may also weaken the splice; while on the other hand, a strip of emulsion left under the joint may cause the splice to lift and tear in the projector.

Use the proper type of cement: nitrate for ordinary film, acetate for safety film, or a dual-purpose cement for either. Color film offers no special difficulties except when double-coated, in which case it is necessary to scrape the emulsion from both sides of the film.

Leaders and Cues

Inasmuch as the standard release print depends for its effectiveness on the exact positioning of the cues and leader footage numbers, projection efficiency is reduced when these have been mutilated. It is the responsibility of the distributor to replace leaders which have become unduly shortened through repeated use, and it also behooves him not to overdo the replacement of film to the extent of interposing several yards of black film between footage number 3 and the start of the picture. Such excess footage must be removed by the projectionist.

In the matter of conserving leaders, projectionists can help by using greater care in threading and by refraining from marking reel numbers, titles, etc., on the leaders with indelible ink. Notations should be confined to the first few feet of the plain "protection leader," and then written only with easily-erased, cellophane-marking crayon.

The painting of squares and crosses on threading-up footage number frames has high nuisance value, as has also the cementing of opaque strips of film across leaders. (There are better ways of threading in frame on machines not having framing lights.) Incorrectly aligned sprocket idler rollers cause sheared and roughened edges on leaders.

The motor and changeover cues are frequently rendered unsightly by projectionists who fear that they may not catch the printed cues when they flash on the screen. Much worse is scratching curtain cues into the emulsion, for their presence is likely to be confusing to projectionists who subsequently use the film. Curtain and lighting cues should be marked on the film with crayon, and then wiped off when the film has completed its run.

Motor and changeover cues which are really too faint to be seen on the screen may be rendered visible by *lightly* scor-

ing them with a regular cue-marking device, several of which are on the market. Holes should never be punched in the film for any reason, and some distributors would do well to refrain from punching identification symbols on titles which are to be projected.

Cleaning and 'Rejuvenation'

The question of "doubling up" single-reel shorts naturally arises. Avoid it if possible, for each cut shortens both leader and title. Especially embarrassing to conscientious projectionists are clipped "The End" titles which flash off the screen in the middle of a bar of music.

Do not attempt to clean film without the proper equipment. Although it is true that short trailers, date "snipes," etc., may be kept in usable condition almost indefinitely by equipment no more elaborate than a bottle of carbon tetrachloride, a block of camphor and a supply of clean rags, the treatment of a long film may result in damage to the emulsion.

Film cleaning machines literally scrub the film with a grease solvent, such as carbon tetrachloride. The liquid is immediately wiped off the film by buffers before it has an opportunity to evaporate and leave the dissolved oil and dirt be-



Indoors or out DeVRY's the buy!

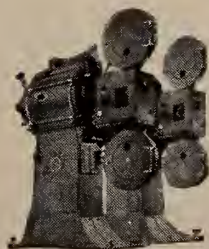
For 250-seat to 6,000 seat theatres—and outstandingly for drive-ins with up to 1,000 car capacity—the trend is definitely to DeVRY "12000" Series projectors, amplifiers and in-car speakers.

Typical of DeVRY-equipped outdoor theatres now being readied for spring opening is the model Drive-In at Muncie, Indiana, shown in the air-view shot above. Other DeVRY installations being made for the coming season are:

CALIFORNIA: Drive-In near San Diego. GEORGIA: Drive-In Theatres at Thomasville & Moultrie. INDI-

ANA: Terre Haute Drive-In. IOWA: Drive-In at Sioux City. OHIO: "Sciota" at Portsmouth, "Triangle" at Wilmington. Also Drive-Ins at Springfield and St. Mary's. MICHIGAN: Drive-In at Grand Rapids. NORTH CAROLINA: Drive-Ins at Asheville, Stateville & Charlotte. PENNSYLVANIA: "Family" Drive-In at New Kensington. TEXAS: Drive-In at Midland. WEST VIRGINIA: Drive-In at Elkins and Meadowbrook. CANADA: Peter Drive-In, Lansing, Ontario.

If you contemplate modernizing present equipment or building anew, be sure and see DeVRY before you buy.



For more of what you want—greater audience satisfaction, increased box office take, closer approach to the perfect show indoors or out—buy DeVRY "12000 Series" theatre projectors and amplifiers. See them at the DeVRY dealer nearest you.

Your Best Buy is a **DEVRY**

DeVry Corporation, 1111 Armitage Avenue
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Please rush information on ☐ "12000 Series" Projectors; ☐ "12000 Series" Amplifiers; ☐ In-Car Speakers

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FOR THE PERFECT SHOW
Indoors or Out



Only 5 Time Winner
of Army-Navy "E"
Award for Motion Picture
Sound Equipment

DEVRY

hind on the film. The cleaning of prints is properly a function of the distributor, and the projectionist may justifiably complain when he fails to supply clean prints.

Projectionists may, of course, take extra precautions to protect prints from oil and dust. It is impossible to keep prints entirely free from oil when used on the older projectors, but greater care in wiping excess oil from the operating side of projectors will improve the situation.

Old film may be "rejuvenated" by placing it in air-tight cans with camphor shavings for a period of several weeks. The celluloid, which has lost some of its

original camphor by repeated exposure to the intense heat of the "spot," absorbs the fumes and thereby regains some of its original toughness and flexibility. The projectionist can prevent shrinkage and brittleness in trailers and other films he wishes to preserve by placing a little camphor (about ten cents a block at a drugstore) in the film cans.

The Problem of New Prints

The emulsion of "green" prints is very soft and amenable to damage. The heat of the projector gate softens it still more and allows it to rub off more readily and collect on film tracks, tension shoes, sprockets, scanning drums, etc. The pro-

jector parts must therefore be cleaned after each reel.

Worst of all, the new print exhibits a variable "drag," chattering violently in the hot gate and "overshooting" on the intermittent sprocket. Overshooting results in an extremely unsteady screen image. A radical increase in gate tension will prevent overshooting, but at the same time it may notch the sprocket holes, practically ruining the print.

To overcome some of these evils the film processing laboratory coats the perforation margins of the prints with a waxing compound. In addition to waxing, some film companies harden the emulsion by chemical treatment or even coat it over its entire surface with special lacquers. But in any case, the projection of "green" prints offers difficulties to the projectionist whose machines are adjusted for the use of old, well-seasoned prints.

Now, projectionists long ago discovered that lubricating a "green" print minimizes the chattering, the tendency to overshoot, and the accumulation of wax and emulsion deposits on projector parts. Each projectionist seems to have his own pet method. Some apply vaseline to sprockets, tension shoes, etc., and others simply squirt oil on the film when the trouble begins. Both of these methods are harmful.

The "oiling" of prints is discouraged by both exchange officials and projection authorities. Modern practice seeks to keep oil off the film, not put it on. With considerable misgivings, therefore, the writer here sets forth the only clean and effective method of lubricating "green" prints in the projection room. (This information is ventured in the hope that it may save prints from being messed by worse methods of oiling.)

Lay the reel of film on the bench. Soak up a small amount of light projector oil in a small clean piece of cloth. Lightly pass the cloth in the direction of the film layers over the entire exposed side of the film roll. Turn the reel over and oil the other side in the same way. If this procedure is properly carried out, not enough oil will have been applied to the film to spread to the sound track and picture, even after repeated runs.

Excluding the factor of careless threading, undue damage to film during projection arises from worn and misaligned parts, excessive gate tension and excessive tension on the take-up assembly. Worn sprocket teeth wreak havoc on the perforations of the film. There is no excuse for failing to replace a sprocket so worn that it "sings".

Kodak's 125 Special Plates

To meet the specialized needs of scientists and research workers, particularly in the fields of astronomy and spectroscopy, the Eastman Kodak Co. produces 125 varieties of special photographic plates.

This ad started something every theatre operator should know....



"As the operator at the Colony theatre I've had the pleasure of using one of your Transverters five and one-half years — approximately 15,000 hours of duty..."

and after 5½ years the
HERTNER TransVerteR
needed only a set
of new brushes!



THE statement of this operator is representative of the satisfactory experience of thousands of users of Hertner Transverters all over the world.

After 5½ years of operation he at first thought his Transverter was due for an overhaul. But only a new set of brushes was necessary and the Transverter was good for many more years of service...

User experience like this proves that with Transverter equipment you are sure of:

- (1) reliable performance.
- (2) constant screen illumination.
- (3) quiet operation.
- (4) low operating cost.
- (5) long life.

*Name on request.

THE **HERTNER**

Distributed by
NATIONAL THEATRE SUPPLY
In Canada: GENERAL THEATRE SUPPLY COMPANY

12600 ELMWOOD AVENUE

CLEVELAND 11, OHIO

Distributed by

NATIONAL THEATRE SUPPLY
In Canada: GENERAL THEATRE SUPPLY COMPANY

"I can't see what this guy has to holler about," wrote a Louisiana theatre operator. "Right this minute I am using a Hertner Transverter which I bought in February, 1928, and it has been in constant use ever since—never missed a 'pop' since then, and the commutator has been cut only three times in all that time."*

And from New Haven, Conn.: "Hertner Transverter No. 11791 installed over nine years ago... has run an average of 57 hours per week for over nine years... a total of 25,000 hours during which the only expenditure has been for grease and a couple sets of brushes."*

Equip your projector with a Hertner Transverter for reliable performance, constant screen illumination, quiet operation, low operating cost, and long life.

*Names on request.

THE HERTNER ELECTRIC COMPANY

Exclusive Manufacturer of the Transverter

A General Precision Equipment Corporation Subsidiary

12600 ELMWOOD AVENUE

CLEVELAND 11, OHIO

THE ELEMENTS OF OPTICAL CONDENSING SYSTEMS

(Continued from page 11)

ception of the elliptical mirror to be considered in its place.

In general, each pair of conjugates, or object and image distances from a given surface, requires a different Cartesian surface, both in reflection and refraction. Fortunately, there is an approximation in refraction which in combination with spherical surfaces will provide a greatly diminished spherical aberration. These parabolic surfaces find wide application in condensers.

The techniques for producing parabolic surfaces in the shop are comparatively simple, and they can be produced

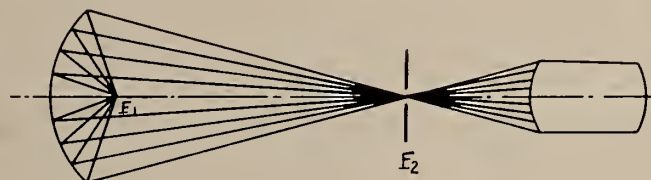
power, the spherical aberration in refraction of parabolic surfaces is considerably improved over spherical surfaces of equivalent power, even at finite conjugates. For this reason considerably better light-gathering power is possible with such surfaces.

If we were confined to spherical surfaces exclusively, condensing systems would be as complex as projection objectives, and many more surfaces would have to be used, with the consequent loss in transmission.

Aspheric Condensers Promising

Aspheric condensers have been exclusively parabolic for the aforementioned practical reasons, but there is nothing to prevent the use of other

FIG. 9. The elliptical mirror used as a condenser.



in large numbers. While such surfaces are not always the answer to condenser problems, from practical considerations their properties are used in answer to specifications where spherical surfaces could not perform.

Because of the loss of curvature toward the periphery, and thus diminished

aspheric forms, if required by physical considerations. Indeed, with the skills gained in the production of such outlandish surfaces as Schmidt corrector plates, it is not at all unlikely that the next direction of advance in condenser design may be toward aspheric surfaces designed specifically for a given appli-

cation. Before this can happen, however, there will have to be a sufficiently large demand to justify both development and production costs, for such surfaces will have limited use.

So far our discussion has been limited implicitly to condensing systems com-



GLEN D. THOMPSON, Oklahoma City, Okla.—Owner and operator of 15 theatres located throughout Oklahoma—writes:

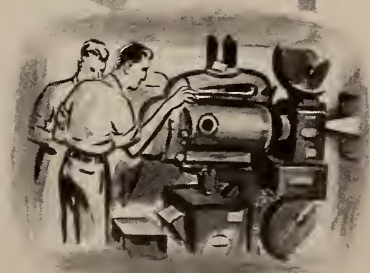
"RCA Service is a good business investment for keeping my sound systems in fine shape."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.



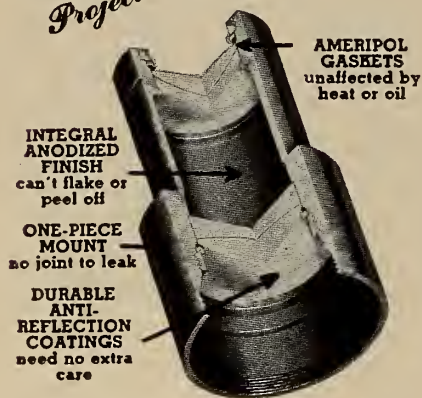
Perfection in Projection is Standard with Super Cinephor Lenses

Successful theatre operators constantly seek perfection in projection. They know that profits are dependent on projecting sharp, uniformly brilliant screen images. That is why the overwhelming majority of new theatres shown in the current Theatre Catalog were equipped with Bausch & Lomb projection lenses. Perfection in projection will be the standard in your theatres, too, if you use Bausch & Lomb lenses. Bausch & Lomb Optical Co., 616-P St. Paul St., Rochester 2, N. Y.



BAUSCH & LOMB
OPTICAL COMPANY  ROCHESTER 2, N. Y.

LOOK inside a SNAPLITE... See Why it's The Projection Lens of Quality



All Aluminum Construction

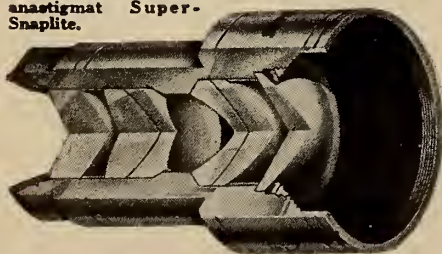
Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

...

TROUBLE-FREE performance is assured by the hermetically sealed construction of Snaplite and Super-Snaplite lenses. They never need to be taken apart for cleaning—no dust or oil can enter! And their anodized finishes can't flake off!

For brighter . . . sharper . . . clearer pictures, use f/2.0 Snaplites or f/1.9 Super-Snaplites in your projectors! Full details of all Snaplite lenses are given in Bulletin 204, available from your local supply dealer.

The fastest lens made—the f/1.9 six-element anastigmat Super-Snaplite.



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Optical CORPORATION

prised of lenses—refractive systems. Reflective systems comprise one of the largest and most important groups of condensers in use today. Mirror systems have a great advantage in weight and in the fact that potentially, at least, the reflective and absorptive losses are less, though this factor is minimized by the fact that in arc lamps the single mirror surface is apt to tarnish and to need replacement rather frequently.

A very curious property of an ellipsoid of revolution (the solid figure created by the rotation of an ellipse about one of its axes) is its ability to bring to a focus all the rays emanating from a point at one of foci of the ellipse. The two geometric foci of an ellipse in reflection are optically conjugate, and a point source at one is imaged at the other by arbitrarily wide cones of light, and without spherical aberration.

This property of elliptical mirrors is very useful, for they can be made to collect solid angles much greater than possible with lenses, and to image the source, which must be comparatively small, without loss of light accurately where needed. This useful characteristic of elliptical mirrors applies only to the geometric foci and to small regions about the axis, so they are employed only with arc sources, where they collect more flux, but are less flexible than lens condensers.

In many incandescent filament condensing systems a spherical mirror is used to collect light which otherwise would be lost. The mirror is placed with its center of curvature in the plane of the filament, at which place the filament image will occur inverted.

The filament is thus imaged on itself with two effects: (1) the image can be shifted slightly so that the coil images fall between the coils, thus presenting a more uniform source to the rest of the system, and (2) by absorption the temperature of the filament is raised, making it brighter. This two-fold gain is possible only with sources possessing no dark region at the back as do arcs.

Three Governing Factors

There are just three factors fixing the illumination on the screen and a change in illumination is possible only through these factors. An increase in any of the three factors—(1) the brightness of the source, (2) the quality and number of surfaces and glass transparency reflected in the factor of reflection and absorption, and (3) the slope angle of the extreme marginal rays to the axial point, or, in more familiar language, the f number at the point—will mean an increase in illumination. But there are natural limits set on all three.

The brightness of sources is fixed by the materials available and does not seem likely to be increased by large

factors over current practice so long as we are dependent upon incandescent surfaces, either of tungsten in the fa-

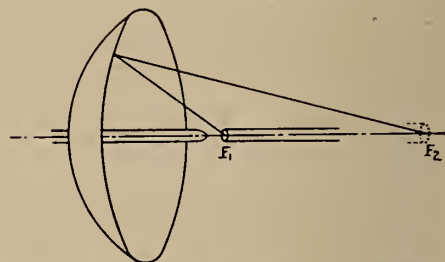


FIG. 10. Perspective representation of an arc reflector. The magnified image of the arc crater at F_1 occurs at the conjugate focus F_2 .

miliar lamp or of carbon and gas in the carbon arc. Of course, it is entirely possible that radically new sources will be developed eventually. The carbon manufacturers are working vigorously to provide greater brightness.

However, the greatest handicap to further progress in increasing the arc source brightness seems to be not so much in the carbon itself as in the concomitant heat transmitted to the image. The limiting factor seems to be the absorption of the film, so that visible energy alone (no infra red) in concentrations at present possible and achieved experimentally is damaging to film.

The second factor of reflection and

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absorption is a serious limitation to the illumination possible through a system. Each air-glass surface reflects approximately 4% of the incident light (and even if filmed about 1%) which is lost to the direct beam as useful light. The demands made upon projection systems compel the addition of more surfaces, thus increasing the loss from this factor. Recent widespread use of coated optics, particularly in projection objectives, has tendered to alleviate this factor, but probably only temporarily.

Obstacles to Advancement

The absolute maximum f number possible in air is 0.5, for then the marginal rays make an angle of 90° with the axis. We are not likely to see such a ridiculous case, but serious and weighty obstacles lie athwart the path to any substantial increase in the speed of projection systems.

In the first place, because of the high quality of imagery required of projection lenses, the designers are only an insecure step ahead of demand even at present speeds. An increase in speed also means new condensing systems, very likely much more complex. Secondly, greater speeds would mean a redesign mechanically of much of the present projection equipment.

Any substantial increase in speed of present projection systems would present some of the aspects of a revolution and would further aggravate the problem of heat in the film gate.

Kodak High-Index Optical Glass

The use of new Kodak high-index optical glass in the production of lenses, to greatly improve the degree of sharpness at various

points throughout the picture area, was described recently by George H. Aklin of Kodak's Hawk-Eye Optical Division.

The use of the new glass has enabled lens designers to obtain considerable improvements in clarity and definition. These improvements, varying with specific lens types, have increased the sharpness of detail throughout the picture area, and have particularly improved the clarity in the corners of the picture. The use of the new glass will also enable camera designers to produce cameras having a larger negative size with respect to the focal length of the lens used.

First Major Development in 50 Years

The new Kodak glasses were announced during the war as the first major optical development in 50 years. They are made with lanthanum, tungsten, tantalum, and other rare elements which give the desired optical properties. The composition of these glasses varies greatly from that of prior optical glasses which are limited in their light-bending and dispersive power by the standard materials used in their manufacture.

While there has been some degree of development in quality in conventional optical glass in the past decade, there have been no substantial gains in index, it is claimed, except in the case of Kodak glass.

Increased Demand for Technicolor May Hasten All-Color Era

Technicolor in 1947 "enjoyed record production, record employment, and record profits," according to its annual report for year ending Dec. 31, 1947. Capacity for service and product was sold out for the year 1948, it was stated. Output of 35-mm release prints in 1947 was 222, 017,439 feet (1946—165, 027, 297). 30 feature-length productions were photographed by Technicolor during the year. The report lists 48 productions now being photographed, in preparation or under contract to be photographed in 1948. Net earnings per share were \$1.55 (1946—\$.48).

"The combination of a diminution in box-office returns and high cost of pictures during 1946-47 largely accounts for the poorer earning statements of motion picture companies," Dr. Herbert T. Kalmus, president, told stockholders. "Also, there is the 75% duty in England which has cut off a very important part of their revenue. There are two points of view on this: first, that the better pictures carry the load and consequently Technicolor will be in greater de-

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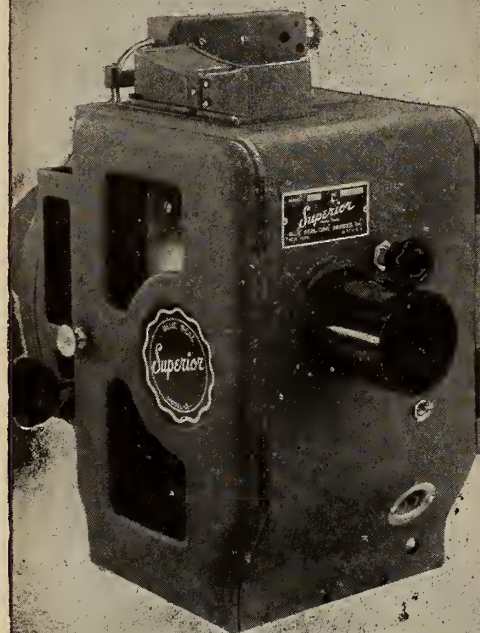
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mand than ever, or second, that Technicolor will suffer through less demand."

Dr. Kalmus said that Technicolor will probably reach a volume of 320,000,000 feet of positive prints a year by the end of 1948 or early 1949. At present, increased capacity is not being used to offer customers more pictures in 1948 but to reduce the excessive backlog of print orders.

Aware of 10 or 15 Competitive Processes

"About September 1948 we expect to begin to receive the new Technicolor three-strip cameras which are currently being built. At that time an increased volume of photography can be undertaken, and as more cameras are delivered the volume of photography is expected to be correspondingly increased." Dr. Kalmus stated that Technicolor "is aware of 10 or 15 competitive processes, some of which are doing a substantial volume of business. Competition should help to hasten the day when our customers will want only color."

Bell System's Coast-to-Coast Tele Hookup; 50 Local Pickup Links

Bell System coaxial cable and radio relay facilities already installed or under construction at the end of 1947 totaled some 7,000 route miles, and construction planned for the next few years will about double the present mileage.

In 1948, the Bell System expects to complete the laying of coaxial cable over the main route from the East Coast westward to Chicago, begin construction on the New York-Chicago radio relay systems, and go ahead with the necessary installations to provide two-way television channels on certain important routes.

Shortly after the coaxial is in to Chicago, two-way television service will be available over this route, including connections at Pittsburgh, Cleveland and St. Louis. The New York-Chicago radio relay system, planned for completion in 1949, also will provide for branching facilities to such major cities as Pittsburgh and Cleveland.

1948-49 Will See Facilities Doubled

On the East Coast, 1948 will witness the extension of television channels from Washington south to Charlotte, N. C., over the coaxial cable, with connecting equipment at Richmond, and the addition of more facilities between New York and Washington.

The first coast-to-coast coaxial cable, joining Florida and California, has gone into service over a 2,600-mile southern route that leads from Jacksonville to Atlanta to Dallas to Los Angeles. With the completion of the Phoenix-Los Angeles section on November 15, the last gap was closed. Early in 1948 this new trans-continental coaxial link will be extended through to Miami, making a 3,000-mile Los Angeles-Miami span.

There has been notable progress in furnishing local television facilities, such as studio-transmitter links and local pick-up links. More than 50 such facilities have been furnished during the last year at such cities as New York, Philadelphia, Baltimore, Washington, St. Louis, Detroit, Boston, Pittsburgh, Chicago and Los Angeles. For pick-up facilities, wire has been used in some cases and radio in others.

TOXICITY OF ARC GASES

(Continued from page 14)

concentrations both of moisture and carbon dioxide.

It would be interesting to know what changes, if any, would occur to these compounds in the arc, say, in an atmosphere containing 2% carbon dioxide with a high relative humidity.

Education, Regulation Necessary

The other part of the problem, that of securing adequate ventilation where arcs are used in occupied rooms, will depend on educational and regulatory measures and the enforcement of the latter by labor departments, health departments or other organizations—largely governmental—that have to do with promulgating and enforcing regulations relative to safety and health in the industries.

Those engaged in such enforcement



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have found that the providing of suitable ventilation facilities is not sufficient. Inspection at intervals to check on repair and proper operation is also necessary. Instances are known where ventilation fans have been operated in reverse so as to cause arc fumes to be blown back on the projectionist.

At one time a great many arc lights were used as sources of heat and ultraviolet radiation used for therapeutic purposes. Some of these were used in physicians' offices and others in private homes. It is probable that in most instances of use ventilation was adequate. However, it could do no harm for those selling carbons for these arcs to accompany the merchandise with suitable cautions or information as to the toxic nature of the fumes.

General Public Health Matter

The American Public Health Association through its various committees and subdivisions, has recommended standard practices covering many subjects of public health importance. It seems to me that the Industrial Hygiene Section could draw up standard recommendations covering this subject as they probably have covering other subjects of importance in securing safety in industry, these recommendations being suitable for adoption and use by the various agencies dealing with industrial hygiene in those places where the carbon arc might be a health hazard.

MONTHLY CHAT

(Continued from page 3)

quantity and quality of screen light. But the boss just won't replace one or the other unit to obtain a matched optical train." This corner recognizes the weight of such an argument—provided that the projectionist has ever brought the matter to the boss' attention, and provided that the projectionist was himself aware of such a deficiency.

One trait all too common among projectionists is that they reserve to themselves the privilege of making up the boss' mind for him, keep mum about any number of things anent the projection process, and thus forego the benefit that might accrue as a result of a few well-chosen words.

Projectionists as a craft are sensible enough to realize that only a very thin line separates the good from the very bad screen result: one slip in any link of the projection chain and the result is not pretty good, or fair, or passable but is definitely n.g. Good or bad—it's as simple as that.

Whatever may be the underlying causes for the generally low standard of projection work, let's be too damned proud of ourselves on the score of our capabilities as a craft to render ourselves so vulnerable as to have an accusing finger justly turned in our direction. That image that hits the sheet is truly the reflection of our standing as a craft.

Da-Lite Projection Data Card

Da-Lite Screen Co. new Projection Data Card will interest all those engaged in audio visual work and picture projection. A handy pocket card, it offers much useful information for ready reference. It contains accurate screen tables for 8- and 16-mm motion pic-

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PASSENGER TRAIN MOVIES

(Continued from page 24)

heavy layers of car insulation, previously installed in conjunction with the air-conditioning system, proved valuable in reducing the outside noise level to a negligible degree. Heavy drapes and carpeting served admirably in correcting the acoustic condition of the car.

The narrow and long dimensions of the dining car presented a problem of good

sound distribution. A beaming effect proved to be the answer. A two-way speaker system is used, although no dividing network is used. The RCA MI-6304 driver unit, coupled to the Altec Lansing Model 808 multicellular horn, and a standard 10-inch permanent-magnet speaker make up the desired combination. The cone speaker simply supplies the tonal balance for the upper cellular unit which beams the sound the full length of the car.

A 32-volt, d.c. 1000-ampere-hour battery, in conjunction with a 5-kilowatt General Electric Amplidyne inverter supplying substantially constant 110-volt a.c., constitutes the power system. The G. E. inverter, Model 5LY153A1, the Amplidyne Booster Inverter which is series-connected with the amplidyne that bucks or boosts the voltage supplied by the axle generator or battery to maintain constant alternating voltage and frequency on the output side of the inverter, is essential for correct sound speed operation of the projection equipment while the train is in motion or standing at a station.

The unusually large capacity of the inverter serves well on peak loads, such as changeover periods, and for operating auxiliary equipment requiring 110 volts a.c. The inverter is approximately, in inches, 45 long by 16 in diameter and weighs 800 pounds. An adequate cradle support is built beneath the car structure to house the complete unit.

The final results were very gratifying, and met with a warm reception from the general public. The inaugural run from Washington to Cincinnati was attended mostly by officials of the company, film critics, editors, and representatives of trade journals. Their reaction, comments, and reception were very glowing in their praise.

As one observer stated, "It is a curious sensation at first, to watch a film and have the theatre jostle gently. But the consciousness of motion soon fades. True, when the camera moves up for a scene that action plus the forward motion of the train brings a feeling of accelerated speed; and when the camera backs away for a long shot you may feel as if you're going in two directions at once. But most of us found the experience rather unique. The sound comes across with exceptional clarity. After a few moments, the movement of the train is forgotten and the story runs quite as smoothly as it does in your local theater."

Succeeding runs proved so popular with the passengers that five additional diners were converted, and a special tavern theatre is now being built.

DISCUSSION:

MR. WOODSON: Does the screen impede the passage of people through the car?

MR. W. R. ISOM: The people are seated to one side of the car and the passage aisle is on the other side. In that way people can pass without interfering with the showing of the film.

MR. DAWL: Was the voltage of the light taken from the a.c. or the d.c. side?

MR. ISOM: I assume it was taken off of the a.c. side.

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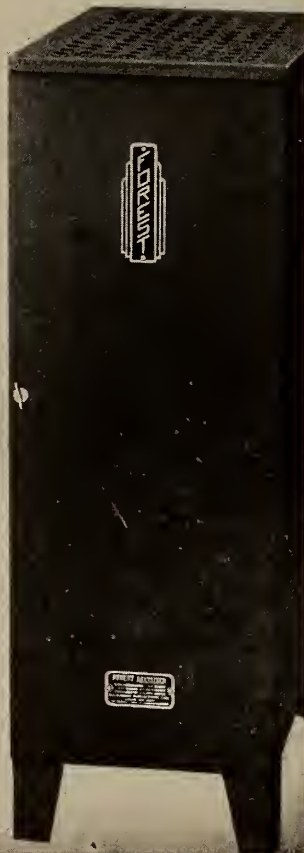
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(Continued from page 19)

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LOCAL 337, UTICA, N. Y.

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LOCAL 348, VANCOUVER, CANADA

D. Calladine, *pres.*; M. Goble, *vice-pres.*; J. H. Leslie, *sec.*; J. R. Foster, *bus. mgr.*; L. B. Pantages, *treas.*; T. E. Foley, *recorder*; F. C. Wilson, *member at large*; J. R. Foster, J. H. Leslie and L. B. Pantages, *del. I. A. Convention*.

LOCAL 376, SYRACUSE, N. Y.

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LOCAL 414, WICHITA, KANS.

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Tele Terms and Talk

THE appended definitions of television terms and talk are reproduced herein through the courtesy of the Tube Department of RCA. While this glossary is by no means to be considered as all-embracing, it does include those video terms most commonly read and heard.

Aperture: In electronics, the opening that limits the diameter of an electron beam.

Aspect Ratio: Proportional relationship of the width of the picture to the height of the picture; in motion pictures and television the ratio is 4 to 3.

Blanking Pulse: A pulse that "blanks out" the undesirable signals produced by return lines in the iconoscope and the kinescope. Also called the "pedestal".

Brightness Control: A manual control for adjusting overall brilliance of the television image.

Camera: A unit containing the optical system and light-sensitive pickup tube which transforms the visual image into electrical impulses.

Camera Tube: An electron tube that translates an optical image into a corresponding electrical image for electrical transmission. The iconoscope and the image orthicon are two types of camera tubes developed by RCA.

Cathode-Ray Tube Screen: The fluorescent material covering the inner surface of the picture end of the cathode-ray tube.

Cathode-Ray Tube: A vacuum tube employing a controlled beam of electrons and used for reproducing a television picture or other visible pattern.

Coaxial Cable: A cable in which one conductor is accurately centered inside another. Used for high-frequency transmission in radio and television. Also called "concentric cable".

Contrast Control: A manual control which adjusts the range of brightness between highlights and shadows in a television picture.

Dipole Antenna: An antenna one-half wave in length, split and fed at its electrical center. Also called a "doublet".

Electron Gun: A system of electrodes arranged in the narrow ends of both camera and receiver tubes to form the electron beam used for scanning the television camera image and for reproducing it in the television receiver.

Field Frequency: In television interlaced scanning, the number of times per second which the frame area is fractionally scanned.

Flickers: Erratic movement of a reproduced picture in motion pictures and television.

Fluorescent: Having the property of giving off light when activated by electronic bombardment or by another source of radiant energy.

Fluorescent Screen: The coating of material in cathode-ray tubes, which glows under electronic bombardment.

Focusing: In a cathode-ray tube, adjustment to give sharp spot definition.

Frame: A single complete television or

motion picture scene. 30 frames per second are shown on a television screen; 24 frames per second are generally used in motion pictures.

Frame Frequency: The number of times per second a television picture area is completely scanned.

Framing Control: A manual control which centers and adjusts the height or width of the television picture.

Frequency Modulation (abbr.: FM): A method of modulation in which the frequency of the assigned carrier wave is varied according to the signal transmitted.

Frequency Separator: The circuit which separates the horizontal-scanning synchronizing impulses from the vertical-scanning synchronizing impulses in television.

Ghost: An undesirable secondary image seen in a television picture. It is caused by the reception of a reflected signal which, having traveled a longer path, arrives slightly later than the desired signal.

Grass: A pattern resembling blades of grass appearing on the screen of a television cathode-ray tube. It is caused by interference picked up by the receiver.

Horizontal Centering: The horizontal adjustment of the position of a television picture.

Horizontal Hold: A manual control for the

adjustment of horizontal scanning synchronization in television.

Iconoscope: A television camera tube developed by RCA. The picture projected on the tube mosaic is broken into elements which when scanned by an electron beam produce electrical impulses.

Image-Orthicon: A super-sensitive camera tube developed by RCA.

Interlaced Scanning: A type of television scanning in which every other horizontal line of the image is scanned during one downward movement of the scanning beam, and the alternate lines are scanned during the next downward movement.

Kinescope: A television receiver tube in which the electrical impulses are transmitted into a picture. Developed by RCA.

Limiter: A stage or circuit which limits interfering noises in FM reception by removing amplitude variations.

Line: A single trace of the electron beam from left to right across the cathode-ray tube screen. The present television standard in the USA is a system of 525 lines to a complete picture.

Linearity Control: A manual control for the adjustment of scanning waveshapes in television.

Monoscope: A cathode-ray tube which produces a stationary pattern for the testing and adjusting of television equipment.

Mosaic: In a camera tube, the light-sensitive surface consisting of a large number of photo-sensitive elements which are insulated from a continuous conducting surface (signal plate). Its counterpart in a film camera is the photo-sensitive emulsion of the film.

[To be Continued]



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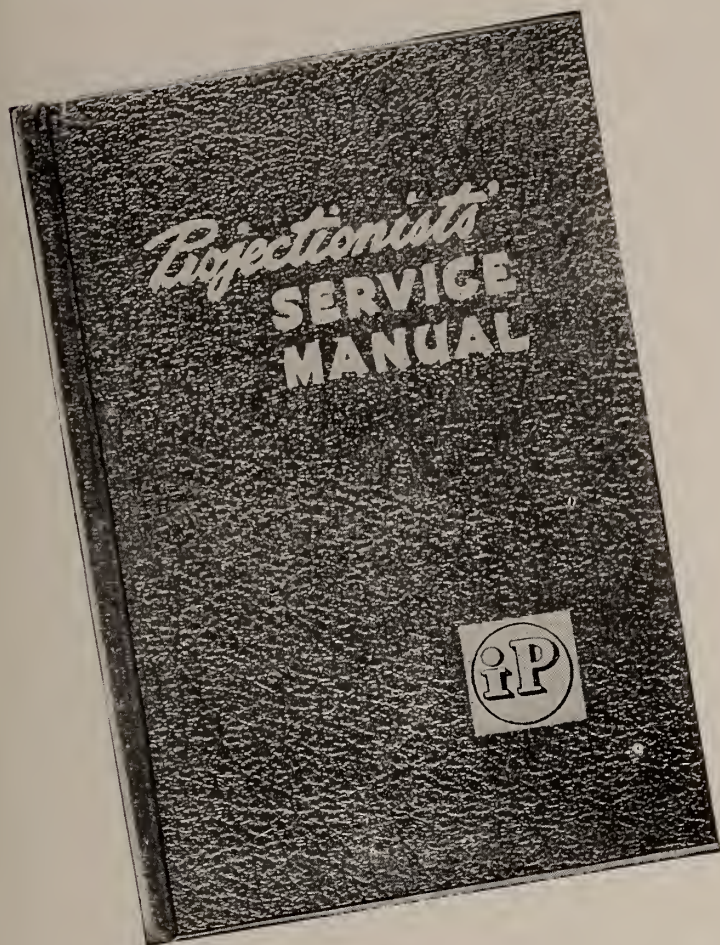
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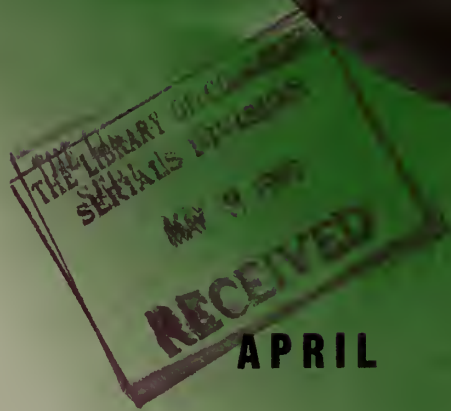
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APRIL

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With Which Is Combined PROJECTION ENGINEERING



HENRY B. SELLWOOD, *Editor*

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APRIL 1948

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MONTHLY CHAT

ONE of the "brass hats" of a film manufacturing company—a fellow who manifests an unceasing interest in his product right down to its showing at his favorite theatre—is considerably peeved at us projection fellows. "Cripes," he ejaculated, "can't your people make a changeover without lousing up the last few frames of a reel and thereby spoiling the illusion for everybody in the theatre?"

"And don't hand me that stuff about a bum print," he continued, "because I attend a first-run theatre and I *know* that the house gets first crack at prints in this exchange area." And plenty more in the same vein.

When the word-tide ebbed a bit, we tried to give our unregenerated "soup mixer" the projectionist side of the story *via* a group of questions. Did he ever hear of print density? Of the current craze for soft-focus effects? Of diffusers? Of aging screen stars, or of others whose facial skin texture is something less than of the peaches-and-cream variety? Of laboratories whose adherence to Standard Release Print specs was notable more in the breach than in the observance? And, very important, has he in recent years seen any extensive backlighting *with carbon arcs* on movie sets?

This deluge of questioning answers inundated the hunter suddenly became the hunted. "What," he stammered, "does all that have to do with sloppy changeovers the result of projectionist markings?"

Just this, was the reply: it all added up to improper print density and to the negligence of the laboratories. On the score of print density, numerous prints shipped to theatres these days are of such density as to screen totally dark except for a center "hot spot" even when projected with a 150-amp carbon arc. And this is *not* the laboratories' fault; the set was not properly lighted in the first place, thus what isn't on the film can't be shown on the screen.

Hollywood has all too many residents these days whose imperfections are being protected and their alleged glamour preserved by an all too calculated lighting plot.

As for the laboratories, it is certainly no fault of theirs that a cue mark positioned in the upper right-hand corner of a frame is invisible to the projectionist simply because it is lost within an area of stygian darkness. But frequently the cue mark is *not* in the right-hand corner, and many times no mark has been printed in at all.

Under these circumstances is it any wonder that projectionists are forced to affix their own markings? Would our critic, if he were a projectionist, elect to risk running-out a reel in preference to making his own markings? At this point our big film stock man was ready

(Continued on page 34)

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Modern Theatre Loudspeaker Systems

By JOHN K. HILLIARD

Altec Lansing Corporation

The introduction ten years ago of two-way theatre loudspeaker systems, while contributing to markedly improved reproduction, posed not a few problems toward the solution of which engineers have since been constantly striving. How well these endeavors have succeeded, and the present high level of loudspeaker performance, are comprehensively set forth in the appended article by an acknowledged expert in the art.

THE use of two-way loudspeakers over the past ten years has permitted the theatre to give the public sound quality representative of the sound recording technique developed during the same period. However, experience indicates that still better recording is possible when improved loudspeakers are available for monitoring purposes during the recording process and for reproduction.

In the past, poor "presence," which can be attributed to several causes, has been one of the principal deficiencies. As an example, dips in the 250-500 cycle region tend to give the effect of individual low- and high-frequency sources. Resonances in the low-frequency units and horns have accentuated narrow bands. Backstage resonance, caused in part by radiation from the rear of the speaker system, has caused detrimental hang-over and masking of the auditorium sound with an attendant loss of presence.

Long air column l-f horns become involved in phasing trouble and loss of presence is encountered owing to the fact that the apparent source of sound tends to recede back in the horn progressively with an increase of frequency.

Folding the horn tends to limit the frequency range in proportion to the sharpness and number of the turns. Rigidity is necessary so that the walls of the horn will not vibrate and dissipate sound power by absorption and also give uncontrolled directional effects.

Accordingly, new loudspeakers have been designed and built so as to bring the quality of sound even nearer to the ideal. The objective in this design was as follows:

Objectives of New Design

1. Higher efficiency in converting electrical power into acoustic power.
2. Higher power capacity per unit.
3. Better transient performance.
4. Uniform extension in over-all frequency range.
5. Improved presence.
6. Reduction of rear radiation.

Improvements in the units have been accomplished by better methods of manufacturing diaphragms, improved voice coil construction, and by the use of magnetic circuits which contribute to higher efficiency.

One of the many improvements in the

loudspeaker system has resulted from the design of a new h-f unit (Fig. 1). The larger metallic diaphragms available in the past were of an annular type. This type of compliance does not provide the necessary excursion at the lowest frequencies which are to be transmitted by the h-f unit. As a result, the frequency response characteristic in the region between 250 and 500 cycles has been found inadequate and the distortion excessive.

A tangential compliance has been used for metallic diaphragms in microphones and small high quality loudspeakers for several years, and it is recognized that its use in large loudspeaker units is essential.

The use of this compliance permits an excursion which is approximately three times as great as that of the annular type for the same strain on the compliance.

The voice coil is wound with rectangular aluminum ribbon which has been

FIGURE 1. Altec Lansing Model 288 speaker.



treated with a high-temperature resistant varnish so that it can dissipate higher power without damage. The use of this edgewise wound ribbon provides more volume of conductor in the magnetic circuit, which in turn increased the efficiency.

Beryllium copper leads are spot-welded to the voice coil wires. This provides a heavy duty lead which will not fatigue under severe use.

The entire voice coil and diaphragm assembly is mounted in a cast bakelite ring (Fig. 2). The voice coil leads are clamped and soldered under flat terminals and a screw is provided for fastening each connecting lead to its binding post. By removing the leads to the binding post and six screws which anchor the bakelite ring to the top plate of the field assembly, the diaphragm and voice coil may be removed for replacement purposes. Two dowel pins are provided for alignment.

The use of this method of mounting the diaphragm assembly permits its removal even though the magnet is charged. As a result, field replacement of the assembly is a simple operation and requires neither special tools nor return of the unit to the factory.

The impedance of the unit, when mounted in a properly matched horn, is approximately 24 ohms over a wide frequency range. Excitation of this new h-f unit is obtained from a recently developed Alnico V permanent magnet material. The flux density is greater than has been used in the best separately excited units supplied.

The magnet itself is of the center core type. The soft magnetic material forming the path between the pole is amply designed so that the flux is conducted

FIGURE 2. Model 288 voice coil and diaphragm assembly.



through the outside walls and up to the air gap with little loss. The external leakage loss is extremely low in this design and as a result does not attract metal objects in the immediate vicinity.

The efficiency of the 288 h-f unit when mounted in a suitable multicellular horn, is such that a sound level of 98 db is produced at 5 feet distant for an electrical input of 0.1 watt at 1000 cycles.

The 515 Low-Frequency Unit

The 515 l-f unit is mounted in a 15-inch die-cast frame which assures permanent alignment of the cone and voice coil assembly. It uses a seamless moulded cone having an effective area of 123 square inches and is moisture-resistant.

An edgewise wound copper ribbon coil is attached to the cone, and a dome is inserted in the center of the cone to provide the maximum active vibrating area. The use of edgewise wound copper ribbon improves the space factor over that of round wire, and since more conductor material can be placed in the air gap, the efficiency is raised and the operating temperature decreased.

Since the 3-inch voice coil diameter is considerably larger than the 2- and 2½-inch diameter coils formerly used, it has a correspondingly increased ability to handle higher power without undue temperature rise, and as a result, the efficiency is little affected with changes in power.

A clamping ring fastens the outer rim of the cone to the frame. The inner spider assembly is held down by means of screws so that it is a simple operation to remove the entire voice coil and cone assembly for replacement purposes.

An Alnico V permanent magnet is provided for the field excitation. The total energy available with this magnet is greater than that previously supplied in energized units now being used. The resonance of the cone and voice coil assembly is 40 cycles in free air. The impedance of the unit is approximately 20 ohms as normally used. It will safely handle an input signal of 25 watts.

To overcome the l-f horn deficiencies mentioned previously, it was decided to use a straight exponential horn having a mouth area and flare rate capable of efficiently radiating the very low frequencies. Several sizes and arrangement of l-f horns were considered necessary depending upon the maximum power rating required and the space that would be available back of the screen for housing the loudspeaker system. A 500-cycle dividing network is used with these systems.

The three largest systems use one, two, and three l-f horns mounted side by side. The number of horns to be used depends upon the amount of power required



FIGURE 3. N500-C dividing network.

and the width of the auditorium in which they are used.

Each horn is of straight exponential taper and is driven by two type 515 units. The air column length is 30 inches. The throat area is approximately equal to the combined area of the two loudspeaker diaphragms. This achieves a loading factor (ratio of diaphragm area to throat area) which is considerably greater than formerly used in theatre systems.

Increased damping results from this higher loading and the excursion of the diaphragm is correspondingly reduced for a given power output. The decreased excursion in turn reduces the distortion originating in the loudspeaker in proportion to the decrease in movement. The entire rear portion of the horn is enclosed so that direct radiation from the backside of the cones is prevented.

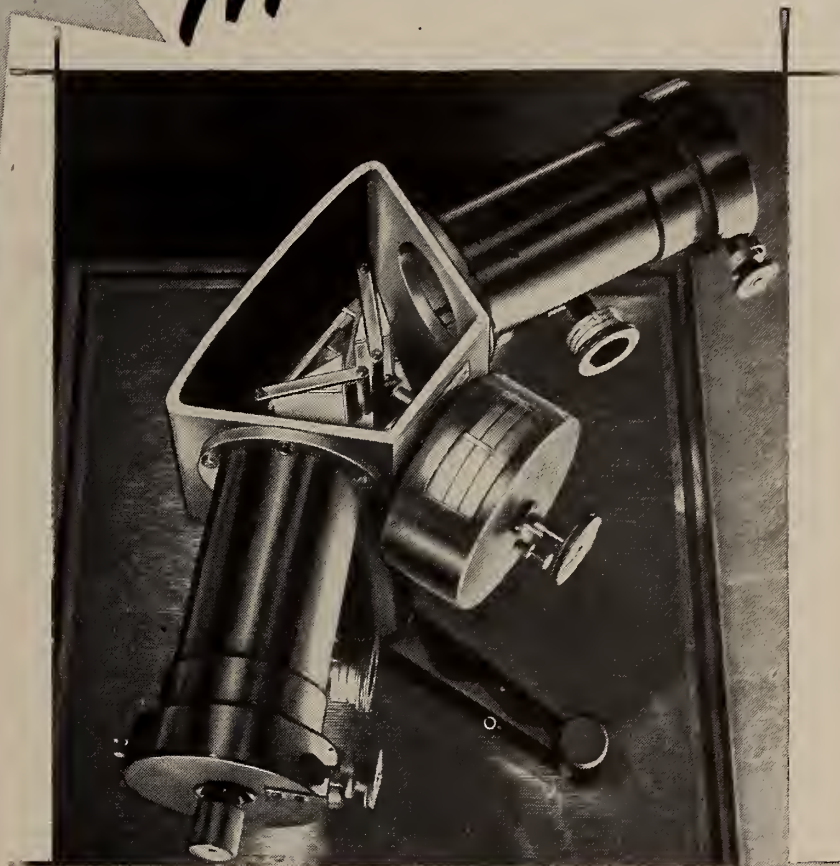
In the frequency range above 100 cycles the radiation from the backside of the unit is dissipated in the enclosure. At frequencies below 100 cycles, this dissipation is not complete and acoustic ports are provided in the front enclosure below the mouth of the horn. These ports provide an acoustic impedance which aids the horn to maintain efficient radiation down to very low frequencies.

High-Frequency Horns

The h-f horn, which is used to radiate the frequencies above 500 cycles, consists of a multicellular horn and the necessary number of 288 h-f units. Throats are available so that from one to four units can be installed on a single horn, depending upon the amount of power required. Various shapes of h-f horns are available depending upon the vertical and horizontal angle of the auditorium.

The N500-C dividing network used (Fig. 3) is a parallel type constant resistance network. It consists essentially of a low- and high-pass filter designed to operate from a common source at

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their input ends. The insertion loss of the network is less than $\frac{1}{2}$ db.

The crossover point is at 500 cycles and at this point the power is divided between the high- and low-frequency legs so that each branch is down 3 db. The attenuation slope is approximately 12 db per octave on either side of the crossover frequency.

Since the solid angle covered varies with the number of cells used in the h-f horn, provision is made for 5 steps, 1 db each, of attenuation in the h-f output. Normally, with an 18-cell horn the attenuation will be set on step 0. Where a 15-cell horn is used, the solid angle of radiation has been reduced.

In order to maintain the same energy concentration per unit of coverage it is then necessary to provide 1 db of attenuation to the input of this horn for a balance. In the case of a 10-cell horn, 3 db of attenuation is needed; and for an 8-cell horn, 4 db is required.

This adjustment is accomplished by changing the shorting bar held under 3 screws. The input impedance of the dividing network is 12 ohms.

Horn Positioning Vitaly Important

Large theatres usually require a wide horizontal angle 100° - 120° , and in these cases it is desirable to mount the center horn parallel with the screen and angle the side horn approximately 15° . This grouping assures uniform distribution of l-f energy to the side seats.

In a two-way loudspeaker system, in the region of crossover frequency, energy is being radiated by both horns. For this reason, it is necessary that a proper relative position between the horns be maintained so that the energy from both horns will be in the same phase relations.

For correct phasing, the two horns must have equal path lengths. In all of the modern Altec Lansing systems the h-f horn is mounted on a wooden platform which can be fastened so that the various sizes of h-f horns can be located at the proper position.

Because of the uniform radiation occurring in the straight exponential l-f horn near the crossover point, phasing

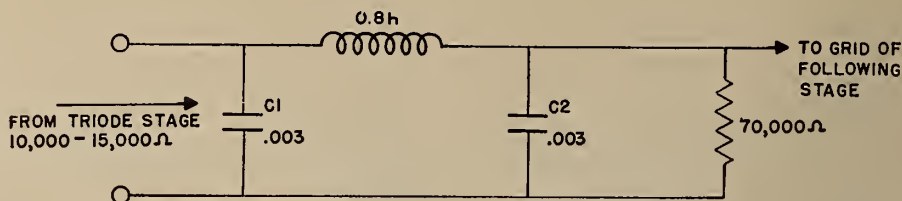


FIGURE 5. Low-pass filter.

is more critical than with previous type two-way loudspeaker systems. The proper phasing can be demonstrated both by acoustic measurements and by listening.

Acoustic measurements out-of-doors indicate that wide variations in response can be obtained near the crossover frequency when the horns are shifted so that the mouths of both the l-f and h-f horns are not in the same vertical plane. Under correct phasing conditions, there is no appreciable variation of response in the region of crossover.

An effective method of checking the proper phase position is to listen to a sound effect having the peak of its energy in the crossover region. When the h-f horn is moved back and forth, a proper position will be reached when the sound effect has the most uniform response and the most presence.

Other positions make the sound remote and unnatural. Because of reflections from the screen and surrounding walls, each installation should be checked for phasing position.

The overall response of modern Altec Lansing systems is sufficiently wide so that they can reproduce efficiently frequencies in the range from 50-12,000 cycles. Of the several factors influencing the type of recording and reproducing characteristics, the most important have been noise and distortion.

The maximum h-f range that can be used in a theatre reproducing system is accordingly limited by this h-f noise and distortion. The l-f cut-off is limited by noise generated by splices, bloop, and noise reduction signals. All of these undesirable signals have strong frequency components below 40 cycles. It is considered good practice, as a result of the aforementioned limitations, to

restrict the useful frequency range in the theatre to the band of 50-8,000 cycles.

In the studio review rooms, where both original recording and release prints are run on the same system, it is the practice to listen to original material with an extended range over that used for the release material. This is considered necessary so that more critical monitoring of the original material will reveal distortion or other forms of trouble which may be encountered in the daily operation of the recording channels.

The recommended response of the over-all sound system using a flat response multi-frequency test film is shown in Fig. 4. It is recommended that all modern loudspeaker systems conform to this curve.

Recommended Over-All Response

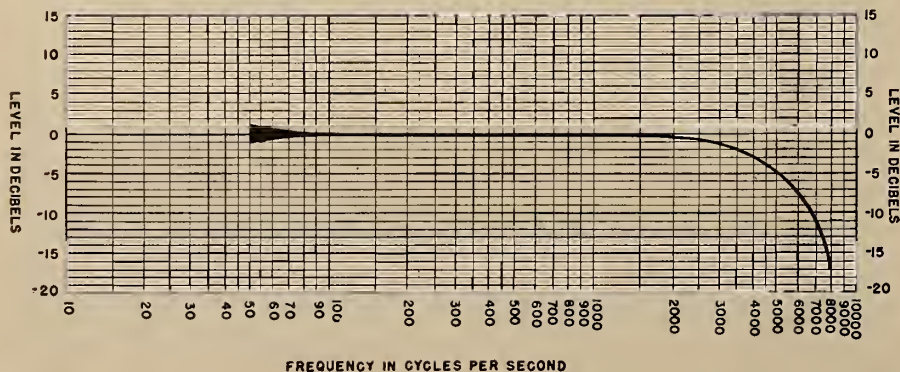
In order to provide an electrical response as shown in Fig. 4, it is considered good practice to use a full section low-pass filter having approximately the values used in Fig. 5. This filter is to be inserted in the plate circuit of a triode amplifier having a plate impedance of approximately 10,000-15,000 ohms. Variations in response can be obtained by varying C_1 and C_2 .

Experience gained from a large number of installations indicates that where the auditorium does not include a balcony, best results are obtained when the vertical angle of the distribution is limited to 40° . This limited angle of h-f radiation reduces "slap" from the ceiling and the upper wall.

It is sometimes more desirable to install new loudspeaker systems before more adequate amplifier is available. The design of the various types of loudspeaker systems assures increased quality reproduction from present available amplifiers which is further enhanced at the time proper amplifier power is installed. It should be stressed, however, that adequate amplifier power will give a presentation as originally planned at the time the motion picture was produced.

As compared with earlier systems, additional damping of the units has been provided by an increased magnetic flux density. For this reason, improved performance can be obtained with these new loudspeaker systems when the internal output impedance of the amplifier is approximately 6 to 12 ohms. The over-all efficiency averages 2 to 8 db higher than systems formerly available.

FIGURE 4. Recommended response of the overall soundhead and amplifier system.

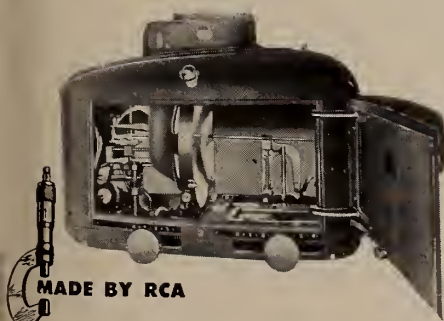




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Nitrate Film Symposium

The article on nitrocellulose film by Robert A. Mitchell which appeared in IP for February elicited widespread interest and numerous comments from the field, the most interesting and comprehensive of which came from the assistant director of an independent research laboratory which prefers to remain unidentified. This commentary, and Mr. Mitchell's reaction thereto, are presented here.*

DESPITE the over-all real merit of Mr. Mitchell's article on nitrocellulose film, it appears to us that it contains enough errors to be dangerously misleading. For example: it is stated that "film base is made by mixing two parts pyroxylin with about one part of camphor, adding traces of plasticizers and stabilizers." The article later brings out the point that the camphor is very important in the reduction of explosibility and fire hazards in the film.

In actual fact no film is manufactured with anything like this quantity of camphor. Many film bases use none whatever, relying on other types of plasticizers to make the film sufficiently flexible.

The chief reason why film base is less explosive or inflammable than guncotton is due to its lower degree of nitration. "Stabilizers" are rarely or never used in film base. The stability is obtained by special purification of the nitrocellulose and not by added chemicals.

Is Film Base Explosive?

Under the heading "Rate of Combustion" it is stated that "celluloid does not and cannot explode either by ignition in a confined space or by percussion." The question as to whether celluloid or film base can or cannot explode has sometimes been debated. These debates, generally, revolve about the definition of the word "explodes."

If we confine the term to the results obtained with nitro-glycerine, dynamite, etc., film base does not explode. However, since it does contain sufficient oxygen for its own combustion, and since its rate of burning increases rapidly as the pressure is increased, film base confined tightly in a chamber and ignited will rapidly generate enough pressure from the gases liberated to burst almost any container. In this sense film base is explosive.

Celluloid Degradation Gases

In general, however, as Mr. Mitchell points out, the reports of film "explosions" may be attributed to a different phenomenon, namely, the rapid combustion of mixtures of the decomposition fumes and air.

The article offers a typical analysis showing in what proportions the celluloid degradation gases are usually present.

This table is incorrect and leads the author to a particularly dangerous conclusion. It probably was obtained from results on the gases from exploded guncotton which show very small amounts of oxides of nitrogen.

A better table is one given by the Chemical Warfare Service in their report on the Cleveland Clinic disaster, as follows:

	% by Volume
NO ₂ (N ₂ O ₄)	6.9 — 8.9
NO	1.4 — 8.2
CO	47.4 — 59.1
CO ₂	21.3 — 24.5
O ₂	None
H ₂	0.9 — 3.2
CH ₄	1.0 — 2.7

Mr. Mitchell also states that "of the celluloid degradation gases themselves, only carbon monoxide is a deadly poison." Although this is true for the analysis given in the original proof, it is by no means true for the correct analysis. In this case although carbon monoxide is a deadly poison, it is far less dangerous

R. A. Mitchell Buttresses His Position

IT APPEARS that the foregoing estimate of my article is valid only on the score of the camphor content of nitrocellulose film base, but even this furnishes an interesting sidelight on the tendency of film manufacturers to skimp on an expensive and very necessary ingredient of their product.

It is well worth pointing out that the large-scale production of synthetic camphor was stimulated by the acute need for this product by film manufacturers. Of course, substitutes are being used, to the acute distress of projectionists who have to "nurse" brittle film.

Composition of Celluloid

When I stated that celluloid consists of two parts nitrocellulose to one part camphor, I had in mind only the highest quality standard celluloid. That these proportions are not far wrong may be gathered from the following:

"A celluloid of normal composition contains about two parts of nitrocellulose to one of camphor." (Masselon, Roberts, and Cillard, *Celluloid*, J. B. Lippincott Co.)

than the nitric oxide which is present.

Nitric oxide has been the cause of most of the deaths which have occurred from nitrocellulose fumes. Its poisonous action is especially insidious in that the immediate effects may not indicate to the injured person that he is in serious danger and it may be several hours before severe symptoms develop. These symptoms are extreme shortness of breath and weakness caused by the presence of liquid in the lungs.

For this reason it is extremely important that anyone who has been exposed to the fumes of film decomposition or film fires be hospitalized at once even though he may feel no symptoms whatever. This precaution may well be a matter of life or death.

Old Film Inflammability

The article also points out that "old film has lost some of its camphor and is therefore more dangerously inflammable than new film." Although it is often true that very old film may be more dangerous than new film, this increased hazard would be almost entirely due to increased likelihood of breaks in the film rather than loss of camphor.

The section on fire extinguishers is good, although we believe it places undue confidence in carbon dioxide fire extinguishers. They are excellent in the projector itself if the carbon dioxide can be released instantly. They are practically useless, as are all other forms of fire extinguishers, if a reel of film has really started to blaze.

"Nitrocellulose plastics are made by taking 70 to 80 parts by weight of nitrocellulose (11 percent nitrogen), mixing with non-volatile solvents and plasticizers . . . and 20 to 30 parts by weight of camphor" (Ralph K. Strong, *Van Nostrand's Scientific Encyclopedia*.)

These formulas, however, are general. Since camphor is combined with the nitrocellulose differently in film base than in celluloid intended for molding, it is possible that nothing like so high a percentage of camphor is present in film base. The general procedure for combining these two ingredients is given by the following quote:

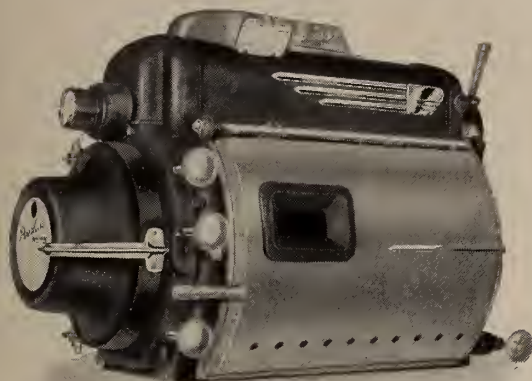
"The dehydrated nitro-cotton is . . . dissolved in tumbling barrels or mixers in suitable solvents, those commonly employed being acetone and methyl alcohol, and at the same time the so-called softeners, such as camphor, are added, these resulting in a flexible film." (George Eastman's article under the heading "Photography" in *Encyclopaedia Britannica*.)

The aforementioned work by Masselon, Roberts, and Cillard states that the sol-

* "The Anatomy of Nitrocellulose Film: Its Import to the Projectionist" by Robert A. Mitchell; IP for February, 1948, p. 5.

Peerless

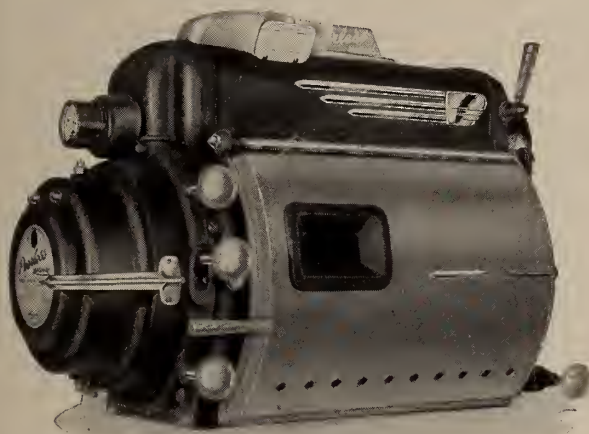
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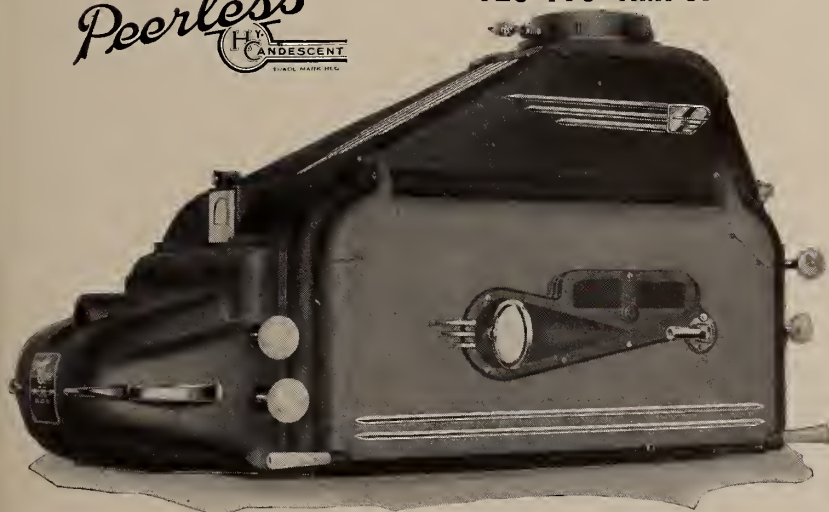
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vent (ethyl alcohol and ether, or acetone and methyl alcohol) is charged with from 12 to 25% of camphor. Suitable solvent esters, such as amyl acetate, are then added to the resulting film-base collodion, or "dope". The camphor content of the dope varies greatly.

Use of Substitute Plasticizers

Naturally, if other plasticizers are used the proportion of camphor may be considerably reduced, but only rarely is it dispensed with entirely, for to do so results in a very inferior film. *Never is film base prepared with no plasticizers whatever.* Camphor substitutes include castor oil, alkyl phthalates, tricresyl phosphate, triethylene glycol di-2-ethylbutyrate, and even naphthalene.

It is when some of the camphor is replaced by other substances having a like action that criticism of my statement concerning the composition of film base becomes especially valid. Stabilizers, such as urea, dicyandiamide and related compounds are sometimes used as stabilizers in film base, but as IP's correspondent points out, purification of the nitrocellulose ("washing") renders their use less necessary.

I must disagree with the contention that "the chief reason why film base is less explosive or inflammable than guncotton is due to its lower degree of nitration". To be sure, guncotton is somewhat more inflammable and much more explosive than pyroxylin, but the very much lower inflammability and the non-explosiveness of film base is attributed by all authorities to the presence of admixed materials—camphor in most cases.

Now, when I use the word "explode" in this connection, I am referring to the ability to explode by percussion—to nothing else. The speed of the explosion-wave of pyroxylin is more than half that of exploding guncotton. And the speed of the explosion-wave of guncotton is fully four times that of nitroglycerine.

Nature of Celluloid 'Explosions'

The so-called "explosions" produced by igniting celluloid in a confined space are ordinarily little more than moderately rapid combustions. This subject is complex, so it may be best to quote at length from Masselon, Roberts, and Cillard. It will be seen that all the facts which these authors present are in complete accord with the statements in my original article.

"Celluloid is spontaneously inflammable towards 170° C., but is not explosive under ordinary practical conditions. This affirmation is based upon a large number of experiments, and also upon the authoritative opinion of Vieille and Will, as well as upon many facts of experience. In many fires large quantities of celluloid have been seen to burn without giving rise to any explosion; 10,000 kilogrammes (11 tons) of celluloid were burnt without exploding.

"The rates of combustion may vary, but there is never explosion. This rate depends on several causes. Aged celluloid which has lost a portion of its camphor burns more rapidly than that recently manufactured. In every case, however, there is no explosion worth mentioning. . . . A brief account of the experiments of Will and Vieille will corroborate this fact.

"Vieille placed in an iron case of 270 litres capacity, having the shape of a well, and furnished with a single aperture of 2.4 square decimetres, some charges of celluloid waste which, reckoned per cubic metre, were 2.5 kilogrammes, 5, 10, 15, and 20 kilogrammes. These charges were spread on the case floor as a uniform bed and ignited by means of a powder train. A sensitive diaphragm permitted the pressure developed in the enclosure during combustion to be recorded upon a revolving cylinder.

"In each case this pressure did not attain 5 mm of water, and the flame passed through the aperture without violence, reaching to a great height.

Regards Experiments as Conclusive

"The experiments of Vieille relating to celluloid are conclusive. Will's experiments have only been performed with small quantities of material, but they are nevertheless decisive.

"Weights of 1.1 to 3 kilogrammes of celluloid waste were ignited upon piles of wood in the interior of a wooden chest. The ignition brought about a very energetic combustion, but without any explosion. The same experiments have been repeated in a closed Papin's digester. The pressure of the combustion gases were sufficiently powerful to sweep away the cover, but the expansive force did not produce an explosion.

"On the other hand, celluloid subjected to pressures reaching 3000 atmospheres may explode. Such pressures, however, are never attained in practice; and Will has attempted to explode celluloid under ordinary conditions, for example, by enclosing it in stout

Under dim colored lights the light-sensitive emulsion is coated on film base. By a carefully controlled arrangement, a broad band of film runs through the machine at the right speed and degree of tautness. The film is later cut to required widths. The emulsion-coating rooms are kept surgically clean, with temperature and humidity carefully registered.



chests of double sheet-iron and air-tight. In no case was an explosion obtained.

"We may conclude from all these experiments that celluloid is not explosive and that only the danger of fire has to be feared. Explosions, however, have frequently occurred in fires. These explosions are not the consequences of the combustion of celluloid itself but through the formation of a detonating mixture made up of the decomposed constituents of celluloid and air."

The foregoing quotation seems to me to settle the question definitely. The statement that "film base confined tightly in a chamber and ignited will rapidly generate enough pressure from the gases liberated to burst almost any container" is indeed true, but it implies a condition never met with in the projection room; in fact, it implies a scientifically constructed and sealed *bomb*!

'Typical' Analysis Table Base

The "typical analysis" given in my article showing by what proportions the celluloid degradation gases are usually present was not obtained, as my critic appears to think, from a study of exploded guncotton but was derived from celluloid decomposed by heat in the absence of air. It is the mean of four closely agreeing tables taken from Masselon, Cillard, and Roberts. The reason why I chose this type of table was because it closely represents conditions which prevail during the hottest part of a film fire.

If I have departed from actual conditions in the direction of a total absence of air, the table cited by IP's correspondent certainly errs in the other direction. Oxides of nitrogen are produced in serious quantities only when the celluloid has access to an unusually ample supply of oxygen at all times during combustion. This table impresses me as an analysis derived from a study of the gases produced during the combustion of finely-divided celluloid, loose film, or cut film such as X-ray film. It is definitely not derived from the conditions of most projection room fires.

Lethal Fume Concentrations

There is stronger reason to view the table with suspicion. NO (nitric oxide) does not and cannot exist in contact with air. It is a colorless gas which is *immediately* oxidized by the oxygen of the air to form the reddish brown equilibrium mixture $2\text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4$ (nitrogen dioxide and nitrogen tetroxide). I cannot imagine how NO should happen to get into an analysis of celluloid combustion gases, hence I hesitate to labor this point.

This glaring error is extended by my critic in his rather dogmatic statement that "nitric oxide has been the cause of most of the deaths which have occurred from nitrocellulose fumes." Apart from being based on a false premise, there is no evidence which definitely establishes

(Continued on page 25)

'Matched' High-Speed Projection Optics

Effect on Uniform Screen Illumination

Discussed by British and American Technicians

By R. H. CRICKS

Technical Editor, Ideal Kinema (London, England)

IN ACCORDANCE with usually accepted optical principles, I have always preached the doctrine that there is no advantage in having a lens of greater aperture than the arc lamp is capable of filling—in other words, that an $f: 1.9$ lens is wasted with a mirror arc working at $f: 2.5$. An article in *INTERNATIONAL PROJECTIONIST* throws some doubt upon this argument, suggesting that the use of a lens of wider aperture than the arc will make for a more even distribution of light over the screen.*

The argument is illustrated by the sketch reproduced (Fig. 1). The angle AOB represents the cone of light emitted from a point in the center of the film aperture illuminated by an arc lamp having an optical aperture of $f: 2.3$. This, naturally, will just fill a lens of the same $f: 2.3$ aperture (for sake of simplicity the lens is drawn as a single element).

But in the case of a point in one corner of the aperture, the conditions are different: only a portion of the cone of light AOB enters the projection lens, the remainder being absorbed by the lens barrel, and so producing a vignetting effect, which the author suggests may amount to as much as a 50% drop in light at the edges of the picture.

If on the other hand an $f: 2$ lens were used, an additional amount of light represented by the hatched area would be received by the lens, causing a gain in illumination at the edges of the picture of as much as 20 or 30%. In addition to greater uniformity, the wider aperture lens will tend to reduce the appearance of a hot-spot in the centre of the screen.

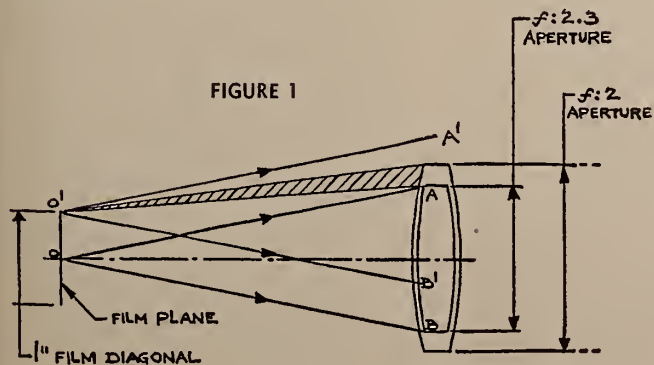
Dispersion from Silver Grains of Film

The author of the article is Dr. John L. Maulbetsch, of the Kollmorgen Optical Corp., who is presumably to be regarded as an expert on the subject, and whose views, therefore, should receive consideration.

There is, however, another aspect which might tend to counteract to some extent the vignetting effect of the lens.

A considerable degree of dispersion of the light rays

* "Uniform Screen Illumination as Related to High-Speed Lenses," by Dr. John L. Maulbetsch; *IP* for September, 1947, p. 5.



By DR. JOHN L. MAULBETSCH

Kollmorgen Optical Corporation

THERE is no question that from an optical standpoint, if a lens of a given speed (say, $f: 2.5$) is provided by beams of light from a condensing system of speed $f: 2.5$ and so designed that the vignetting effect in the condensing system exactly matches the vignetting effect in the lens, there would be no advantages in increasing the speed of the lens. In such a perfect match all the light admitted from the condensing system enters and passes through the lens and reaches the screen.

In practice, however, especially in condensing systems of the reflector type, there is little vignetting effect on the condenser side, and to make full use of the light available, lenses should also have little or no vignetting effect.

Greater Projection Angle Increases Vignetting

This "matched" condition existed fairly well in old-type projection equipment where reflectors had speeds of $f:3$ or less and the lenses used were in the longer focal lengths, i.e., 6 to 10 inches. In recent times, however, reflector speeds have been increased, and with improvement in lamphouse efficiency it has become possible to increase the magnification of the projection system, thus requiring lenses of shorter focal length.

With a shorter focal length the projection angle is increased and, as is well known, in most commercial lenses the greater the projection angle the greater the vignetting.

(Continued on following page)

takes place in the silver grains of the photographic image.

The immediate results would be to cause rays of light from any given point in the image to be refracted outside the theoretical cone of light from the arc.

Some of the light so dispersed from the center of the image would thus tend to fall outside the cone of light AOB , and thus outside the area of the lens; while some of the light from the edges of the picture would find its way into portions of the lens not theoretically within the area of the cone of light AOB . Consequently, a larger proportion of light from the edges of the picture would find its way on to the screen than is indicated by Dr. Maulbetsch's sketch.

Another factor that must not be overlooked is that a photographic image always shows a greater contrast when viewed by light at a narrow angle. The effect of this would appear to be that the edges of the picture, to the extent of the light lost in the cone AOB , would show increased contrast, which would in some way make up for the loss in brilliance.

It is apparent that the whole business is far more involved than simple optical theory would suggest. I should welcome the views of some of our optical designers on the subject.

effect. We therefore have a condensing system with little vignetting effect and projection lenses with vignetting effect. Even though the speeds of both the reflector and the lens are the same, from an optical point of view they cannot be called "matched".

A better match, resulting from increased illumination of the screen, can therefore be obtained by either (a) decreasing the vignetting effect in the lens while keeping its speed the same, or (b) by increasing the speed of the lens, which automatically permits admittance of more light for the larger angles.

Definition of Term 'Matched' Needed

It is apparent that when mentioning "matching" between condensing systems and lenses under present conditions of projection, it is not sufficient to talk only of the speeds of the elements, but it is also necessary to consider the vignetting effect or amount of light which can be furnished by the condenser and transmitted by the lens for the edges of the field.

The writer believes that all the various comments brought forth for and against matched systems are caused by the fact that the word "matching" is not defined by everyone in the same fashion. Some refer to speed for the center only, and others talk about the effect for *all* the points of the picture to be projected.

In the British comments† mention is made "that the whole business is far more involved than simple optical theory would suggest," and, as an example, dispersion due

† "Matched Lenses and Mirror Arcs," by R. H. Cricks: *Ideal Kinema* (London, England) for December 4, 1947.

to silver grains of the film is cited as one of the factors that will affect the theory. It is true that in any practical application there are factors which will affect to some extent the theoretical considerations.

High Speed Lens Aids Image Over-all

If we consider the effect of dispersion due to the silver grains, the conclusions reached by the basic theory are strengthened rather than weakened. For, as stated by the British commentator, light is thrown outside of the original cone coming from the reflector both for the center of the picture and the edges, so that to accommodate passage of a larger cone a lens with a greater aperture is strongly indicated. That is, a higher speed lens would be of definite advantage not only for the edges, as indicated in the original article, but also for improving the illumination at the center of the picture.

Various Factors Affect Basic Theory

As mentioned previously, the various factors encountered in practice—such as dispersion, size of the arc, location of the carbons, and so on—no doubt affect to some extent the results to be expected from consideration of basic optical theory, and these effects can be best determined by tests.

Comparative projection tests, using modern lenses of speeds of $f:1.9$ and $f:2$, have shown that the total illumination of the screen is greater than the illumination obtained with lenses of lower speeds. It was also found that this increased illumination is obtained mostly toward the edges of the picture, thus providing a more uniformly illuminated screen.

Discussion Incident to SMPE Screen Brightness Report

OMITTED from the March issue of *IP* due to lack of space was the discussion incident to the report of the Screen Brightness Committee of the SMPE.* These discussions, in the nature of a symposium which induce full and free expression of opinion by a number of people, serve to clarify the views expressed in any paper and thus constitute a most important segment of the presentation.

It is desired to stress the fact that the aforementioned report reflects the results obtained in a *preliminary* survey by the Committee of a selected group of theatres.† The project over-all embraces one of the most comprehensive programs ever undertaken by a committee of the SMPE and ultimately should prove of the utmost worth to the theatre field.

The discussion, in part, follows:

Q. Has the Committee established what would be a desirable screen brightness for theaters?

A. The present standard is 9 to 14 foot-lamberts as measured at the center of the screen, with the projector running but with

no film in the gate. Whether that standard will be changed I am not prepared to say.

Q. Knowledge of the surrounding brightness is very important in interpreting the data such as you have given. Is there any intent to gather data on the screen brightness level, excluding projected light?

A. That is part of the longer-range objective of the Committee.

Effect of Equipment Deficiencies

Q. You mentioned that 50% of the theatres were getting 75% of the available light. Do you mean that there were misadjustments in the equipment or do you mean that the equipment was rated at a higher rating than the theatre actually was using?

A. Data have been published in the *Journal* indicating the total quantity of light that could be expected from various combinations of arcs and optical systems. Those data were taken into consideration along with the exact projection equipment in the theatre, and the ratio of that which could be expected to that which was actually measured was determined. The Committee did not investigate *why* that difference occurred.

Q. The factor of the screen itself and the light coming from it represent additional items that are elusive. Will this report include that eventually? One is the age of the

screen; two, the location of the screen, the atmospheric condition; three, the polar characteristic of the screen.

Unless we investigate all these things, the changing factor of what you are getting off that screen is amazing. Unless we add those data we do not know what actually is getting to the people's eyes.

Screen Age, Polar Characteristics

A. The age of the screen with its condition was not specifically investigated. The Committee went into the theatre and measured what the condition was at the moment. Whether it was a new screen or an old, a dirty screen or a clean screen was not considered.

With reference to the atmosphere: Since all these measurements were made without any people in the house, I suppose we could assume that the atmospheric conditions were best.

We expected to consider the polar characteristic and we still hope that the information that we have will show that. You will recall the slide on which was shown where and how the brightness was measured. The brightness reading was taken at the center of the screen and at the upper left- and lower right-hand corners, from four extreme positions in the theater.

When we have sufficient data they can be analyzed to tell what is the polar characteristic of the screen. While the indications are not definite, yet they tend to show that the screens all were matte and had a fairly uni-

(Continued on page 28)

* Page 10.

† *J. Soc. Mot. Pict. Eng.*, March 1948.



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PLAINLY, everything about this scene says Paris—though filmed in a studio far from France.

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Non-Synchronous Disc Reproduction

SOUND-ON-DISC in theatres now has no significance other than the playing of commercial phonograph records on non-synchronous reproducing apparatus before shows or during intermissions. The practice is a good one in theatres presenting separate matinee and evening performances, but the continuous-show theatre, or "grind" house, admittedly has little use for the non-sync.

So little consideration is apparently accorded overture and intermission music in the average theatre that the poorest quality of disc reproduction is tolerated with no desire on the part of management to improve matters. This should not be. If the added attraction of recorded music before shows is worth having at all, it is worth having at its best. There is no reason why the quality of disc reproduction should not compare favorably with that of sound-on-film.

In a large number of theatres the non-sync is a makeshift device improvised by the projectionists from odds and ends of parts—a turntable from a discarded phonograph, a pickup someone threw backstage when the synchronous sound-on-disc reproducers were dismantled years ago, a few condensers and resistors from the local radio shop, etc.

Some of these homemade jobs—particularly those that *do not* make use of old, damaged magnetic pickups—are above criticism. Their performance, when properly coupled to the amplifiers, is superb. Surprisingly, many complaints of poor non-sync reproduction come from theatres which have installed commercial phonographs or record players. Where, then, does the trouble lie? In the reproducers, themselves? Hardly ever.

Incorrect Coupling to Amplifier

Barring such faults as uneven or improper turntable speed, needle-tracking errors, worn records and needles, etc., incorrect coupling to the amplifier is the usual cause of unsatisfactory disc reproduction. Gross mismatch of pickup and amplifier input impedances has a much worse effect than mere loss of gain, since it introduces distortion of various types into the sound.

Magnetic pickups usually have low impedances (measured in ohms for a selected frequency of sound). Crystal pickups are high-impedance devices. These two types of pickups are not interchangeable, as a rule, without alterations in the amplifier input circuit.

Amplifiers designed for the use of low-impedance magnetic pickups usually have an impedance-matching transformer

By ROBERT A. MITCHELL

connected to the phono jack. Those made for the use of high-impedance pickups ordinarily have no special matching device—the pickup "hot" lead is connected directly to the grid of the first gain-amplifier tube following the volume-control potentiometer. And the resistance of this potentiometer constitutes the terminal resistance, or "load," for the pickup.

This matter will be made much clearer by Fig. 1 which shows the first two stages (much simplified) of a theatre amplifier. The first stage, the one to which the p. e. cell circuit is connected, amplifies the sound-on-film current from the projectors to approximately the same level as current generated by a phonograph pickup. In this particular amplifier the first stage leads to a "film-disc" switch which enables sound current from either film or disc to be selected for amplification in the second and subsequent stages.

Step-by-Step Trace of Hookup

But what about the coupling of the pickup? Trace the circuit in the diagram. Begin at the crystal pickup and follow the "hot" lead (marked *red* because this wire usually has red insulation) into the amplifier. When the film-disc switch is set on "disc," the "hot" lead connects directly to the potentiometer designated by P. (Ignore resistor R for the moment.) The lower leg of P is grounded. So also is the black wire of the pickup. Hence the electrical circuit: pickup, resistance P, ground, and back to pickup.

The function of a crystal pickup is to generate minute currents corresponding to the variations of the record groove tracked by the needle. It is this current which flows through the circuit traced above. This type of pickup works on the principle that a crystal of Rochelle salt

subjected to pressure generates voltage. Scientists call this the "piezo-electric effect."

Potentiometer P is the "load" upon which this crystal-generated voltage works. In most amplifiers the potentiometer has a resistance of 500,000 ohms. The voltage-drop across P operates the grid of the second-stage tube. Because this resistor has an adjustable arm, as much or as little of this voltage-drop may be utilized as desired. *Potentiometer P is, in fact, the volume control of the amplifier.*

Consider now the resistor marked R which is cut into the "hot" lead of the pickup—in series with the potentiometer. Of course, the pickup will work without R, but if better reproduction of the bass tones is desired (with less surface noise or "needle-scratch"), we must increase the load resistance upon which the pickup acts.

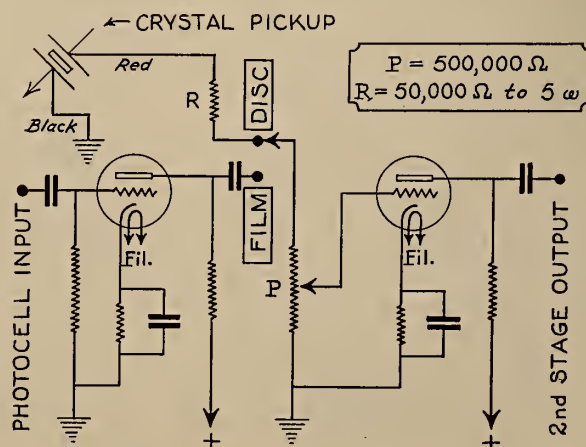
The most pleasing results are obtained when the terminal load impedance has a value of from 1 to 5 megohms (a megohm is 1,000,000 ohms), and the greater the load resistance, the "boomier" the low notes. Whereas P is ordinarily only 0.5 megohm, R may have any value from 0.5 to about 5 megohms.

There is usually a "catch" to all good things, however, and bringing out the "lows" by increasing the load resistance in this manner is, unfortunately, no exception. Consider R as a continuation of P—that is, think of R and P together as a single resistor. There is a certain voltage-drop across this resistor, isn't there? But the sliding or rotating arm of the potentiometer (the arrow in contact with P in the drawing) can only move through the range of P. It is physically impossible for it to move up through R, which may not be located in the amplifier cabinet at all.

For this reason we can utilize only the

FIGURE 1

Simplified diagram of first two stages of a theatre amplifier, showing the electrical circuit of pickup, resistance P, ground, and return to pickup. Potentiometer P acts as a volume control.



drop across P; the drop across R, regardless of its desirable effect on the frequency response, reduces the output of the pickup to the amplifier.

If your amplifier is a powerful one, the slight loss of voltage through R will not be a serious drawback. It will only necessitate a higher volume setting for the non-sync. If, on the other hand, your amplifier is too low-powered for the necessary gain, you may have to connect the non-sync to the first, or photocell, stage of the amplifier. This is easily done, though another switch will have to be added to the system. (Ask your sound service engineer for advice.)

Above all, *do not* change the ohmic value of the gain-control potentiometer, for by so doing you may upset the impedance match for the sound-on-film reproduction.

Reducing Excessive Amplification

If the crystal pickup needs to be connected to the very first stage of amplification, a by-pass condenser may have to be used in the "hot" lead, depending on the point of cutting into the circuit. If too much amplification is obtained, as will probably be the case, resistors or condensers may be shunted across the pickup leads. Condensers shunted across the leads are commonly used because they short-circuit the high frequencies, thus reducing surface noise and high-frequency distortion.

Too great a "top cut," however, will cause voices to sound muffled, and the life-like brilliance of orchestral music will be lost. Condenser shunts cannot be used when the amplification is barely sufficient, for they very greatly reduce the output of the pickup.

When amplification is great, making it necessary to cut down the output of the pickup, the level to choose is that which permits the non-sync to be played at normal volume with the volume-control setting a trifle below the lowest sound-on-film setting used—the setting for newsreels, for example.

So far this discussion has been concerned only with the crystal type of pickup. Nothing that has been said of resistor values applies to low-impedance pickups. In fact, even a 500,000-ohm resistor in series with a low-impedance pickup will cut off the sound current entirely! The only really satisfactory solution to impedance mismatch when a magnetic pickup is employed is a special matching transformer.

Perhaps there is no phonograph or microphone input jack on your amplifier, and you do not know where to connect a non-sync. In that case careful study of your amplifier wiring diagrams will disclose the location of terminals for connecting sound-current sources to the grid of a gain-amplifier tube.

The simplified drawing printed with

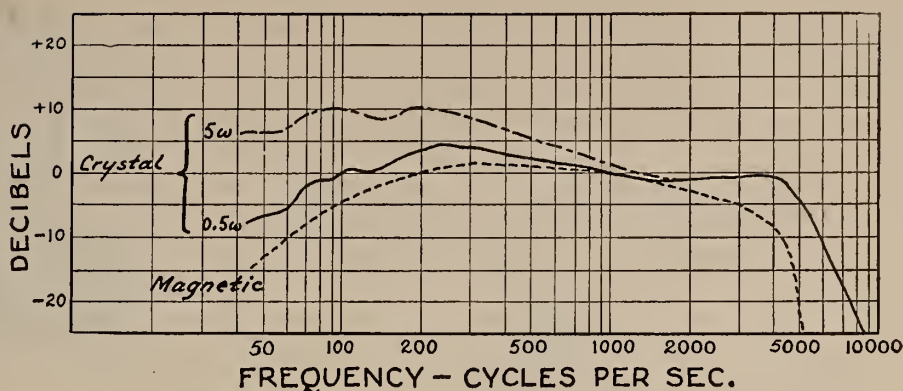


FIGURE 2

this article may help you locate the proper point in the wiring diagrams. If you have sound service, by all means have a consultation with your service engineer. He is in a position to obtain any parts that may be required.

The characteristics of the crystal pickup are worth attention. This type of pickup is comparatively light, needle pressure on the record being about one ounce. When correctly lined up so that it tracks the record grooves tangentially at all times, record wear is negligible with the crystal pickup. It must, however, be protected from excessively high temperatures, for the crystal rapidly deteriorates at temperatures exceeding 125 degrees F.

Crystal Pickup Characteristics

In the matter of frequency response the crystal pickup is somewhat better than the old-style magnetic pickup. Fig. 2 tells the story. The dotted line represents the response of a magnetic pickup, the solid line that of a crystal pickup with a 0.5-megohm load resistance, and the broken line that of the same crystal pickup with a 5-megohm load. (This reveals graphically how different values of terminal resistance affect the low-frequency response of crystal pickups.)

It is always advisable to check periodically the turntable speed of your non-sync. This is done by placing a slip of paper on the turntable so that it projects beyond the edge of a record, and counting the number of revolutions in a minute. Commercial records are recorded at speeds ranging from 78 to 80 r.p.m. Most radio transcriptions are made at 33 1/3 r.p.m.

If the turntable revolves too fast, the tempo of music will be speeded up and the pitch of tones will be raised. Another effect of above-normal speed is a ludicrous alteration of the timbre of voices, which at high speed take on a Donald Duck quality. A below-normal speed has opposite effects.

While slow reproduction sometimes makes music more pleasing to the ordinary ear, the musically astute listener may shudder at the shift of "key." Be

that as it may, if one has to choose between, let us say, 82 and 74 r.p.m. for the turntable speed, the lower speed is preferable. 78 r.p.m. is standard.

Uneven turntable speed results in "wows." This serious fault should be corrected even if it means the purchase of a new motor and turntable.

Careful Handling of Discs

Ordinary phonograph records are pressed from a mixture containing shellac, limestone and lampblack, hence they are easily scratched and broken and warped by heat. They should be kept in their paper envelopes to protect them from dust. They should never be piled on the radiator or the rectifier: the heat may ruin them.

In the better theatres overture and intermission music is matched to the mood of the feature film. This discriminating use of sound-on-disc establishes the atmosphere, or mood, which dominates the main attraction. In the average small-town theatre, regrettably, the efforts of dramatically alert projectionists in this direction will go unrewarded. But in any situation monotony must be avoided, for variety is the life of the theatre. A steady diet of screaming jive does not provide variety.

New Eastman Plastics Laboratory

A new plastics laboratory, first of its kind in the camera industry, has been opened by Eastman Kodak Co. as an adjunct to its Camera Works in Rochester, N. Y. The lab will enable intensification of development work on plastic parts for cameras, projectors and other photographic apparatus, and will utilize devices to measure impact, bending, hardness, stiffness and heat distortion. A "plastic parts museum" will be a feature of the lab.

Academy Recording Award to W.E.

The Academy award for "the best achievement in sound recording" during 1947 went to a producer using Western Electric recording, marking the 15th time in 18 years that W.E. has gained this coveted honor. Winning film was "The Bishop's Wife," with other two nominees for the top award, "T Men" and "Green Dolphin Street," also being W.E.-recorded.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THOSE doubting Thomases who have speculated upon the role that the IA would play in the rapidly expanding television field have only to digest the



Eugene Atkinson

terms of a contract recently negotiated by the enterprising Gene Atkinson, business manager of Chicago Local 110, with Station WGN-TV, owned and operated by the *Chicago Tribune*. Quite apart from the fact that the *Tribune* has never been overly sympathetic to organized labor in general, and to the IA in particular, the essence of this contract negotiation is the well-defined pattern that it establishes for all IA units in their dealings with television stations, whether now operating or contemplating operation by reason of holding a CP (construction permit).

At Chicago Station WGN-TV a Local 110 man will work; five days weekly from Monday to Friday, eight hours per day, a total of 40 hours, at a weekly salary of \$132; four-hour minimum call for Saturdays and Sundays at *double time*. Highly favorable as is this contract, we think that its implications on a broad nation-wide scale as a pattern for all affiliated Locals is vastly more important. It's the *doing* and the *getting* that counts, as Atkinson proved so many times.

That Chicago will be a 100% IA city television-wise now seems assured, because the only other video station now operating, WBKB, has been an IA outpost in this new art for the past several years.

• A touching tribute to the memory of a fellow member is a resolution recently passed by San Antonio Local 407 in honor of Homer W. Newman, who died March 14 this year. It was resolved to have inscribed on the minutes of the Local a Memoriam for Brother Newman, copies of which were sent to the IA Bulletin and to IP. Newman had the

high regard and affection of all who knew him because of his fine character and his devotion to the ideals of the craft, and his death left a void in the hearts of his many friends. We extend our deepest sympathy to his survivors.

• The 36th anniversary celebration of Birmingham, Ala., Local 236 was held last month at the Cavu Club. President Walsh, W. P. (Fred) Raoul, and IA representative Al Johnstone, of New Orleans Local 293, were among the invited guests.

• The sponsors of a most unusual theatre tax bill introduced in the New York State Legislature which called for the assignment of a fireman at each performance in a theatre, had their ears pinned back when the legislative leaders in Albany were deluged with a barrage of protests against the bill by various exhibitor organizations and by the IA. The bill would have compelled the theatre owners to pay each fireman \$10 per day for each performance, the number of firemen assigned to a theatre depending upon the seating capacity. The 10th District executive board lost no time in voicing its disapproval of this vicious measure and joined forces with the exhibitor groups in defeating it.

• Local 279, Houston, Tex., is planning to erect a two-story brick building on a parcel of land recently purchased which will house its headquarters and clubrooms. During the recent war many GI's stationed in nearby camps enjoyed the hospitality of the Local's clubrooms, and we personally received a number of first-hand stories about the swell treatment accorded the servicemen. It can be taken for granted that with enlarged headquarters and under the guidance of its officers, Eddie Miller, business agent, and Walter J. Kunz, secretary, the Local will outdo itself in Southern hospitality.

• We have received many comments from IA men through the past several years relative to the fine courtesies extended by Metro-Goldwyn-Mayer in permitting these craftsmen to go through the M-G-M West Coast studios. It's

really staggering to witness an operation of this kind and to realize what tremendous quantities of brainpower, money and effort go into the making of that relatively tiny ribbon of film that the craft projects onto the screen.

There may be some who dismiss such courtesy as a waste of time and quite meaningless. We know better. Nobody can tell us that when projectionists are back in their old home towns and on the job, that the M-G-M trademark on a film doesn't stir them to give just a little bit better than their best.

To M-G-M and to Merle Chamberlin, projection factotum and host at the studio, our thanks on behalf of the craft.

• Congratulations to Charlie Peck, former official of Wichita, Kans., Local 414, on the arrival of a baby daughter, LuAnna Mary. This is the second Peck offspring to date, and from all indications it will be some years before Charlie will become eligible for membership in our famous 25-30 Club.

• A resolution adopted at the last annual AFL convention authorized the week of May 10-16 as "Union Label Week," the general purpose of which is to create better public relations and promote good-will for all organizations in the Federation. The resolution calls upon management and labor to co-

Harold J. Allaster (left), member of Local 105, London, Ont., Canada, and chief projectionist at Loew's London Theatre, is shown receiving his second 10-year Loew's service pin from Fred Jackson, manager of the theatre.



operate in demonstrating the excellent relations that exist between these two groups, and it was resolved, therefore "... that the AFL approve of this means of public relations and urge all national and international bodies, local unions, union label leagues, and women's auxiliaries of labor to cooperate in co-ordinating their activities for the display of everything that is union-made and services that are performed by members of the AFL unions during that week."

- New York Local 306 scored a signal victory in its recent wage negotiations with the major circuits and Broadway houses. President Herman Gelber, who headed the Wage Negotiations Committee, reported to the membership that for the first time in the Local's history a president of the union did not have to sign away any of its benefits in order to obtain a new contract.



Herman Gelber

Under the new agreement, all projectionists employed by the major circuits and Broadway houses will receive a 15% increase in pay, retroactive to September 1, 1947. The closed shop policy will prevail as heretofore, as it was agreed by all parties concerned that the closed shop section of the Taft-Hartley Law did not apply because projectionist unions are not engaged in interstate commerce. The contract freezes manpower and pay; that is, should a theatre change its policy from, say, 18 hours daily running time to 12 hours daily running time, there can be no reduction of manpower or pay for the men already working in that theatre.

The old "booking clause," a bone of contention in the negotiations, remains as is in the contract; but if the U. S. Supreme Court should rule against the major circuits (Bill of Divorcement) the exhibitors will have the right, if they cannot arrive at an amicable settlement with the Local, to reopen negotiations upon 30-days written notice.

It took ten months of bitter wrangling between Local 306 and the exhibitors to conclude these negotiations. Several moves were made to strike the theatres affected, but upon appeal to IA President Walsh the strike plans were halted. However, all's well that ends well. To the members of the Negotiations Committee we extend our heartiest congratulations for the swell performance of a difficult task.

Assisting Gelber in the negotiations were the following officers of the Local: Harry E. Storin, vice-president; Ernie Lang, recording-secretary; Morris Kra-

vitz, N. Y. business agent; Ben Scher, Brooklyn business agent; Jimmy Ambrosio, treasurer; Izzy Schwartz, financial-secretary. Also serving on the Committee were Nat Doragoff, Steve D'Inzillo, Joe Bassin, Bert Popkin, Artie Silverman, Charlie Kielhurn, Harry Garfman, and Tony Rugino.

- St. Louis Local 143 celebrated its 40th anniversary last month at a banquet held in the Gold Room of the Hotel Jefferson. The General Office was represented by Dick Walsh, Fred Raoul, Felix Snow, and Frank Stickling. President Walsh, principal speaker of the evening, presented gold life membership cards to the five surviving charter members of the Local: George O'Rafferty, of the Fox Theatre; A. P. Petill and T. J. Brown, both of whom are employed at Loew's Orpheum Theatre; Fred Kessler, working at the Ritz Theatre, and E. C. Siegfried, of the Shenandoah Theatre.

Leo C. Canavan, president of Local 143, was the toastmaster and introduced the other officers of the Local: Harry A. Barco, business representative; Leonhard Michael, vice-president; Howard W. Flier, recording-secretary; Emil J. Werner, financial-secretary, and E. Ray Fitzgerald, treasurer.

The celebration was voted one of the smoothest-running and most enjoyable parties ever given by the Local. The committee in charge of arrangements was headed by George T. McDonald, chairman, assisted by Fremont Noertemann, Leonhard P. Michael, Elmer Wieser, Ray V. Miller, George H. Oonk, and Waldon C. (Elmer) McDonald.

- Following the trend of many Local Unions throughout the country, Boston Local 182 recently purchased a three-story building to be used as union headquarters. This news did not surprise us one whit, for when Walter Diehl, business agent, and Joe Nuzzolo, president,

were in New York several months ago they told us of their dissatisfaction with the Local's offices and expressed their determination to find more suitable and permanent quarters.

- After making an intensive survey of theatre television, Lester B. Isaac, projection supervisor for Loew's, Inc., stated flatly at a recent large-screen television



Lester B. Isaac

demonstration that he still stands behind the opinions expressed in his paper delivered at the May 1946 SMPE Convention (*Television in the Theatre?*, IP for June 1946, p. 14). Discussing the possible effects of television upon motion picture theatres, Lester repeated the views expressed in his paper ... "that of all the claims made to date regarding the practical possibility of television as a form of public entertainment, not one has developed as an accomplished fact."

It is his contention that "merely as a novelty, television cannot bring patrons to the theatre. It must be entertainment comparable to that to which they have been so long accustomed." To which we say "amen."

- Too few men occupying important posts in our industry have little if any understanding of the worth of the contributions of the operational, or "practical," men to the over-all progress of this business. It's a real pleasure, therefore, to record the views on this topic of Loren L. Ryder, president of the Society of Motion Picture Engineers and also director of recording for Paramount Pictures.

Ryder shows his concern about main-

IA President Richard F. Walsh was the principal speaker at the 41st anniversary celebration of St. Louis Local 143 last month. At the right is shown Harry A. Barco, business agent for Local 143.



taining the balance between the theoretical specialists and the practical groups in a letter to this department, excerpts from which follow:

"In the early days . . . almost all improvements resulted from the inventive genius of the operational men. As this industry expanded and developed we gained theoretical specialization—a normal trend in American industry. The advent of sound brought . . . a whole new field of technological thinking and specialization.

"It is no longer possible for any one man to be completely versed on all technical phases of motion picture activity. The SMPE is now an important link in the whole chain of development and operation. Important is the fact that most theoretical specialists study and learn all they can about the practical problems from the operational men, who in their own right are the specialists in their field of endeavor.

"It is my desire as president of the SMPE to equalize and balance the flow of this knowledge . . . at an early date, so that as television and other forms of entertainment enter this industry, more men of operational understanding can contribute to this changing and new art. We cordially and most earnestly invite all operational men, and particularly projectionists, to join with the Society and make their contributions to as well as gain from the knowledge of others."

The many outstanding technological contributions by projectionists to the industry's progress are apparent on every hand and need no recounting here. Projectionists as a craft have always given of their best in this direction and have been eager to share their talents with the industry.

Frankly, however, and with no intent to slight any group, we have always felt that projectionists were never accorded the recognition and, equally important, the acceptance as industry members that their contributions warranted.

Speaking for ourselves, and we hope for the craft, we want to congratulate Loren Ryder, and the Society he so ably represents, for his keen perception in recognizing the trend of things techno-

IA ELECTIONS

LOCAL 552, ST. PETERSBURG, FLA.

M. Roy Nobel, *pres.*; Paul E. Barnes, *vice-pres.*; Frank N. Barhydt, *fin.-sec. and treas.*; Francis L. Hill, *rec.-sec.*; A. H. Greeley, *bus. agent.*

LOCAL 667, PORTLAND, IND.

Victor Welsh, *pres.*; Edward Earhart, *vice-pres.*; Glen Fields, *sec.-treas.*; Ronald Blankenbaker, *bus. rep.*; Edgar Smith, *guard.*

LOCAL 165, HOLLYWOOD, CALIF.

Walter R. McCormick, *pres.*; Howard Edgar, *vice-pres.*; Richard Hennley, *sec.-treas.*; Jas. J. Eddy, *bus. agent*; Wm. P. Daugherty, Richard B. Frisbee, Charles Groman, Harold Masser, *board of directors*; Paul R. Cramer, Wm. Harris, *board of trustees*; Irving Dratwa, Leo S. Moore, H. Arnold Smith, *exam. board*; Jas. J. Eddy, Donald T. Freiling, Charles Grohman, Richard Hennley, Water R. McCormick, *del. Central Labor Council*; Jas. J. Eddy, *del. State Fed. of Labor, etc.*

logically and for his forthright expression on this matter.

• Back in 1933 Projectionists' Local 380, Oklahoma City, Okla., purchased and installed at its own expense projection and sound equipment at the Oklahoma State Hospital for Crippled Children, and since then has regularly presented free Saturday matinee shows there. The programs usually consist of a feature picture, cartoons and shorts. Picture bookings are arranged by members Hi Berling and Howard Wortham.

Each week the business agent of the Local (Berling) assigns a projectionist who picks up the films, takes them to the hospital, runs the pictures on schedule, and returns the films to the exchanges. Eight major film companies cooperate splendidly in this worthy endeavor by booking their best product free of charge.

As a mark of their appreciation for

the entertainment brought to them weekly, each holiday the crippled children send the Local greeting cards they make themselves. The members regard these affectionate tokens as ample recompense for their efforts to bring a bit of sunshine into the lives of these unfortunate youngsters.

• To avoid a jurisdictional dispute, the executive boards of IA Local 163, Louisville, Ky., and IBEW Local 369 are scheduled to meet shortly in an effort to iron out a few wrinkles that presented themselves with the installation of speakers at the drive-in theatres. The problem relates to which union shall have charge of the installation and care of the speakers at the drive-ins, and their removal at the end of the season.

• A heart attack suffered while working in the projection room of the Old Vienna Theatre, proved fatal to Sam Geddis, member of Buffalo Local 233. Geddis, who was 72 at the time of his death, joined the Local in 1914 when it was known as Local 229, and boasted of being the first projectionist to run a full-length movie in Buffalo.

• Add the name of J. Gordon Jackson, member of Vancouver Local 348, to the ever-growing list of IA fishing enthusiasts. He was elected secretary of the Port Alberni Tyee Club.

Incidentally, Jackson is the inventor and manufacturer of the Jackson Reel Alarm which has found so much favor with Canadian projectionists.

• In the recent 1948 Red Cross drive, Chicago theatrical unions were represented by Gene Atkinson and Clarence Jalas, Local 110, and Sam Lamansky, Local B-45. Needless to say, the IA Locals made their usual splendid showing.

• U. S. Air Force Pilot 1st Lt. Frank M. Holick, member of Local 380, Oklahoma City, Okla., (son of charter member Frank T. Holick) literally dropped in at Local headquarters to attend the meeting last month. Young Holick has been stationed at Okinawa for the past two years and spent his 30-day leave with his parents and in renewing old friendships.

• Philip (Blackie) Bordonaro, president of Local 444, New Kensington, Penna., was elected president of the Allegheny Kiski Valley Central Labor Union. We take this means of notifying Blackie that we intend to keep our promise when we meet next August at the Cleveland Convention.

Capsule Estimate of Tele Problems by RCA Prexy

By DAVID SARNOFF

President, Radio Corporation of America

We hear predictions that television, to be a success, must be sent into the home over wires instead of by radio. But the suggestion can be answered by an echo from history. Back in the 20's, when radio pioneers were looking for revenue, the cry went up that "wired-radio" to the home, on a rental basis following the pattern of the telephone, was the answer to the problem. That idea proved false.

It is equally in error to believe that television, as an industry, must be "wired-television," with the viewer in the home paying for the programs. Definitely, it will be broadcast through the air, and the programs will be free to the "looker" as they are to the "listener."

The argument that television must offer a continuous flow of Hollywood extravaganzas is also false. *The great attraction of television is timeliness.* Many of its programs are seen as they happen; they are both entertainment and news. As its day-to-day operations and the reactions of audiences are studied, they will enlarge its scope and increase its service and revenue.

Your Best Buy . . .

U. S. SAVINGS BONDS

The first of a series of articles anent the most pressing problem confronting the motion picture theatre field today—television. The many-faceted aspects of this problem are set forth comprehensively and lucidly by an outstanding figure in the motion picture, radio and video fields, and, incidentally, one so conversant with the art of projection as to have merited honorary membership in several units of the organized craft.

The fact that the author and IP hold widely divergent views as to the practicability and the ultimate economic impact of television on the motion picture theatre renders imperative, in line with traditional IP policy, the publication herein of this series. Comments from IP readers, particularly those in present video centers, anent the effect of home television sets on theatre attendance is urgently solicited.

Theatre Television: A General Analysis[†]

By DR. A. N. GOLDSMITH

TELEVISION pictures in theaters will, initially at least, have the strong appeal of novelty. Accordingly, the screen pictures may be smaller than those projected from motion picture film in the same theater. Since, in any case, a screen having a specially desirable directional characteristic will be used, the problem of masking thus will be automatically solved by a screen change between motion picture presentations and tele projection.

The directional characteristics of the television screen will also be discussed herein. Even if an intermediate-film process is used, the presumably lesser detail or resolution of the tele pictures will justify a smaller screen image than for film projection.

Since motion pictures in most theaters range from 9 x 12 to 18 x 24 feet, tele pictures may fall within the range of 6 x 8 to 15 x 20 feet. Ultimately, it may be found desirable and economical to use identical picture sizes for tele and motion pictures, but at present this seems unnecessary.

The picture masking may be made slightly different for tele. It is permissible to mask off more of the corners of the picture in tele, since the pictures may fall off in resolution more rapidly toward the corners than do the projected motion pictures.

Ample Light, Well Distributed

The light which forms a projected tele picture (without intermediate-film recording) is produced in a cathode-ray tube by special electrical methods. It is a costly form of illumination and should be conserved to the utmost and utilized efficiently. For this reason unusually high-speed tele projection systems are used (of the so-called Schmidt-optics type) with speeds as high as $f/0.6$ to $f/0.8$. Further, a screen is preferably used which will throw light only to those portions of the house occupied by the audience.

Any of the precious light which is

thrown to the ceiling or off to the side walls of the house is wasted. The directional screens may, therefore, be specially suited to the design of the theater, giving a considerable central concentration in long, narrow houses, and a wider horizontal spread in shallow and broad houses. Vertically, light will similarly be concentrated between the top balcony and the front of the orchestra.

In the front rows of some theaters, the line structure of the tele image occasionally may be visible, particularly with imperfect interlacing. This is not a particularly serious defect, as has been shown by the satisfactory experience in this regard with home tele receivers. In any case, it is possible that slight residual optical aberrations may sufficiently soften tele pictures so that the line structure is not noticeable in practice.

A thoughtful balance must be struck between tele picture size and the corresponding brightness. If the picture size is increased 50%, the picture brightness will of course drop to less than 50%. The motion picture field has experienced a continual urge toward larger and brighter pictures. In some theaters brightness has been sacrificed for size. Tele

pictures may well sacrifice something of their size for the sake of acceptable brightness.

Picture weave was quite noticeable in the early days of the motion picture but now it is not a serious factor unless badly worn film is used in decrepit projectors. In tele, picture weave is rather unusual and should not be noticeable under normal projection conditions.

Tele picture brightness will depend to some extent on the skillful adaptation of the directional screen to the particular theater. Obviously, theater tele will require close co-ordination between the video engineer, the architect, and the exhibitor.

Picture Brightness, Whiteness

Motion pictures today have a screen brightness of about 10 foot-lamberts. Tele pictures should show the same brightness or, preferably, 25 to 50% higher brightness. This may require acceptance of a somewhat smaller picture in monochrome. For color presentations, picture size might require still further reduction in the early stages of that art.

Tele pictures should show no marked falling off in brightness toward the edges and corners. The skillful optical design of the projection system meets this requirement. Unfortunately, some film projectors have been so designed (or used) that the brightness at the center of the picture is undesirably higher than that at the edges. If an intermediate-film process is used for tele presentations, this factor will require consideration in connection with the suitability of the projector itself.

It is well known that defects in an optical system, namely the so-called optical aberrations, result in a loss of contrast, or decrease in gradation range in the viewed picture. Whereas a "brilliant" or "sparkling" picture may have a gradation range between 50-to-1 and 200-to-1, a "flat" picture may have a range of only 10-to-1 or even 20-to-1.

However, special care should be taken in the design of tele optics and the selection of tele pictures to maintain an ac-



[†] J. Soc. Mot. Pict. Eng. for February 1948, p. 95.

ceptable contrast in the projection picture. This will also require a certain amount of careful maintenance of the optical system to reduce undesired and parasitic reflections.

The "whiteness" of the tele picture presents an interesting topic for opticians and colorimetric experts. At present no standard has been generally adopted to control the "whiteness" of either tele or motion pictures. Indeed, change in the illuminant or arc-type in motion pictures gives rise to marked changes in the tint or "whiteness" of the projected picture. Fortunately, the human eye easily adapts itself and regards most light tints, when sufficiently bright, as "white." Thus, after a moment or two, the eye will regard a light yellow, a light yellow-green, or a pale blue as "white."

Nevertheless, if there is any marked difference between the color of the projected motion picture and the color of the tele picture, this may be detrimental to one or the other. It would be well to keep tele pictures and motion pictures in monochrome at approximately the same "white" tint. This tint may, however, vary for different theaters.

Picture Image Resolution

The picture detail, or resolution, adopted for theater-tele practice should be a reasonable compromise between extremely high detail (and correspondingly high cost of specialized equipment and precise operation) on the one hand, and insufficient "story-telling" capabilities or undue softness of the pictures, on the other. If the subject matter is presented with sufficient clarity so that but few complaints, if any, are received from the audience, it is certain that an acceptable value of resolution has been adopted.

Motion pictures have a theoretical resolution of between 1000 and 1500 "lines." (These are "television lines," and rep-

resent twice the resolution value expressed according to ordinary photographic or motion picture practice.) Tele pictures usually will not require as high detail as the motion picture itself. The 525-line pictures now broadcast probably will be acceptable. Appreciable improvement would result only from substantial increases, such as going to approximately 800 or even 1200 lines. Such a change does not seem economically or otherwise justified at present.

[NOTE: The author suggests that a special film short having gradually diminishing light immediately precede the tele interpolation so as to condition the audience to the lower light level and inferior resolution of the latter presentation.—Ed.]

There is one major argument in favor of using the current tele-broadcast resolution value. If theaters are to be able to use tele-broadcasts of transcendently important events, it would be somewhat complicated to have to use 525-line tele reproduction for such events and then to switch over to some other and higher number of lines for other tele material syndicated to the theater. Such a switch-over is by no means impossible, but it is an added complication, probably unjustified in the early stage of the art.

While the picture resolution will undoubtedly fall off toward the edges and corners, just as it does with motion pictures, the change should not be obtrusively noticeable. This is not an unduly difficult requirement.

Present Theatre-Tele Methods

Two of the main methods for reproducing tele programs on theater screens will be discussed briefly, together with a summary of their apparent present-day advantages and limitations.

(A) The first of these is cathode-ray-tube projection systems, usually using

Schmidt optics or some high-speed projection-lens system.

Such a system has numerous advantages. It reproduces the program *instantaneously as received*, a factor of psychological importance. It is free from the cost of expendable materials, such as photographic film. Inasmuch as a high-power arc is not used, the cost of electric power probably will be lower. There is no processing cost for film involved. Nor is there any possible loss in picture quality or resolution (nor, on the other hand, a possible improvement in adapting the gamma characteristics of the picture to the television system) as a result of photographic recording, processing, and projection.

Gaps or jumps in the program, resulting from the time required for film processing, are absent. Accordingly, the program continuity or flow is more readily obtained.

The system has certain limitations including the following:

High-speed optics generally require either that they be designed for a specific throw which is convenient in the theater or, alternatively, that the equipment be installed at the position required by the designed throw, even if that location be inconvenient.

If tele projectors are to be placed in the projection room, they will require additional space and may, therefore, lead to structural changes and building reinforcements. Further, tele projectors are unlike film projectors, and accordingly the theater staff will require retraining to utilize such equipment. In addition, the optical and electrical systems in such projectors must be cleaned and inspected systematically to ensure effective operation, and according to methods not at present familiar to the theater staff.

Since tele projectors use optical and electrical equipment, as do film projectors, it is conceivable that certain questions of labor jurisdiction will arise.

And, finally, when direct projection of tele programs takes place, no film record exists and therefore there is no available means for repeating the program at some convenient, desirable, or prearranged time (except by re-transmitting it from a film record or from a repeated live-talent performance at the point of program origination).

Intermediate Film Method

(B) With the second method, the incoming program is reproduced on a bright cathode-ray tube, but the image is projected not on the theater screen but on motion picture film in a recording camera. The film is rapidly processed in special high-temperature rapid-flow processing systems and is then projected from the theater projectors (with or with-

(Continued on page 26)

GENERAL STUDIO VIEW SHOWING VARIOUS TELEVISION SHOW COMPONENTS
At the "ready" signal there swing into action a battery of cameras, overhead "mike" boom, a script girl, multiple monitoring channels, and the show's director in the foreground.



IF THE full story of the crafts in Butte is ever written it will be found that they were deeply sympathetic with the miners' efforts to secure improved terms of employment, and that they openly and actively cooperated with them on many occasions. In fact, in Butte members of the same family were miners or craftsmen, and when marriages occurred the son-in-law would frequently be a member of one group and the father-in-law of the other.

Always the miners preached industrial unionism, and at all times the crafts granted the miners' right to choose the form of organization they liked best, while vigorously denying their right to force their form of organization upon those who, because of experience, were opposed to it.

The record shows the Western Federation of Miners in time affiliated with the American Federation of Labor, and shortly afterward severed the relation, in turn organizing the Western Federation of Labor.

The founders of the Western Federation proudly proclaimed that it would soon take over the A. F. of L. After that venture had collapsed, the miners reaffiliated with the A. F. of L. For reasons not important here, it changed its name and became the National Union of Mine, Mill and Smeltermen, which was a member of the A. F. of L. until the C. I. O. was organized in November 1935.

Organize National Industrial Unions

These two efforts to organize great nation-wide industrial unions were followed by others. Shortly after 1893 Daniel DeLeon organized the Socialist Trades and Labor Alliance with the announced purpose of superseding the A. F. of L. DeLeon proved an ardent champion of the industrial type of union.

MEMBERS OF THE EXECUTIVE COUNCIL, AMERICAN FEDERATION OF LABOR, 1900

Front row, left to right: Thomas I. Kidd, vice-president; Samuel Gompers, president; Frank Morrison, secretary; James Duncan, vice-president. Top row, left to right: John B. Lennon, treasurer; Max Morris, James O'Connell, and John Mitchell, vice-presidents.



Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, American Federation of Labor

XIII. First Phase of Craft-Industrial Union Fight

One of his organizing methods was to attack continually the policies and practices of the A. F. of L.

Later on, but still in the Nineties, John Sherman launched the Allied Mechanics, whose objective was to bring all metal workers into a single organization. Sherman's pattern was largely the German Metal Workers Federation. He made little progress but did add to the growing clamor for industrial unionism raised by various organizations and intelligentsia throughout the land.

Substantial success had not followed these efforts to supplant the national and international unions banded together in the A. F. of L. While busy in criticizing and belittling the craft conception of organization and the crafts' refusal to approve or condone partisan political activity, the leaders of industrialism had failed to give their members sufficient protection. Their membership fell off at a disastrous rate.

Formation of the I.W.W.

In 1905 the leaders of the rapidly declining organizations met to plan for the future. Debs and the remnants of the American Railway Union; Moyer, Pettibone and Haywood of the Western Federation of Miners, with but a handful of followers; Sherman with his feeble group, and the few still admiring the fading star of the Socialist Trades and Labor Alliance joined hands.

They pooled their interests and or-

ganized the Industrial Workers of the World. This consolidated organization was welcomed with a flourish of trumpets by those intellectuals who resented the fact that the A. F. of L. had not invited theorists and dreamers to sit in its councils. The Industrial Workers of the World was also warmly welcomed by all those who desired to see the international unions submerged by a flood of industrial unionism.

The Industrial Workers of the World, profiting by obvious mistakes of previous groups in applying the industrial form of organization, advocated the formation of six or seven national divisions within its membership, each having jurisdiction over general division of industry or commerce, such as transportation, metal manufacturing, textiles from the loom to the finished garment, etc. Before the collapse of the I. W. W. there came a new twist to the industrial union conception.

The new conception was that industrial unionism had so far failed of success because the principle had not been boldly and thoroughly applied. The I. W. W. had conceived of but six or seven organizations, each with millions of members, but that would still mean divided ranks in labor. The proper form of organization was a single unit embracing all wage-earners.

'One Big Union' Visionary

So the One Big Union, led by impractical visionaries, came into existence. For a little while it gathered strength in some localities, but its hodge-podge membership could make no progress. They became disillusioned and the One Big Union ended its brief career.

The history of these organizations has been written by advocates, by opponents and by historians interested only in the facts. Those who desire to inform themselves further have a voluminous record to read.

What is well to keep in mind is that the American Railway Union, the Western Federation of Miners, the Socialist Trades and Labor Alliance, the Allied Mechanics, the Industrial Workers of the World, and the One Big Union have all written their record of failure.

The discussion of Socialist objectives, industrial unionism and the activities of rival labor movements occupied much of the time of the early conventions of the American Federation of Labor. The Federation's purpose and its policy were be-

ing continually misrepresented by its rivals and opponents.

Many workmen were becoming confused as to whether the A. F. of L. was endeavoring to destroy industrial unionism. Even within the Federation there were some internationals which were uncertain as to the Federation's ultimate objective.

The Scranton Declaration

So that the Federation's purpose and policy could be clearly, definitely, and officially stated, a committee consisting of Samuel Gompers, James Duncan and John Mitchell, all members of the Federation's Executive Council, prepared a statement which was presented to the Scranton convention of 1901. This report was adopted and became known as the Scranton Declaration.

In substance it held that every national or international union, regardless of its strict craft or industrial union character, was equally welcome in the Federation and would be equally protected. Each international was guaranteed full autonomy in its internal government and freedom to adopt any structure of organization which its members believed most advantageous to them. There was but one restriction—no affiliated international because of its structure of organization would be permitted, for that reason, to claim the members of another affiliated international.

Already developments in industry—the first evidences of the mass production which was to come—and the subdivisions within the crafts which were taking place because industry was expanding and specializing, led many of the more rigid craft unions to modify their form of organization so that the developing subdivisions would all be included in the craft's membership and the organizations' protective control.

At the Scranton convention Samuel Gompers made it definitely clear that the Federation was not an organization

of craft unionism or of industrial unionism, but a trade union federation in which every type of organization could find assistance and protection. All that was demanded was that the international unions, in matters of Federation policy, should accept the democratic principle of respecting decisions reached by majority vote, with the assurance that no decisions so reached could interfere with any union's unquestioned autonomy.

In 1907 a further step was taken to

strengthen the effectiveness of the affiliated international unions. Authority was given to the building trades to organize a Building Trades Department within the Federation through which they could act directly upon building trades activities. Similar authority was given to the metal trades to organize a Department. Not long after a Railway Employees Department and a Union Label Trades Department were organized.

[To Be Continued]

McAuley's Two New Magnarc Lamps, With One Marking Entry Into 1 KW Field

TWO new projection arc lamps just announced by J. E. McAuley Manufacturing Co., of Chicago, expand considerably the scope of operations of this firm and enable it to offer lamp facilities for every type and size of theatre auditorium as well as for the drive-ins. These new units are the post-war Peerless Magnarc, having a current range from 40 to 70 amperes, and a new Magnarc "Special" which is pointed directly at the so-called low-price field in the 1 KW class.

Noteworthy is the fact that the wide-range Magnarc price will not be increased, while the Magnarc Special will actually sell at a reduced list price.

Original Magnarc Quality Retained

The new Magnarc retains all of the basic construction features of the original Magnarc design plus 20 distinctly new improvements, two of which at least warrant special mention. First, is the unique trim-alarm system which lights a pilot light to indicate when either one or both the burning carbons require retrimming. Second, is the means provided for adjusting the negative carbon laterally or vertically, while the arc is burning, for correct lineup with the positive. No tools are required for this

adjustment, the job being simple, speedy.

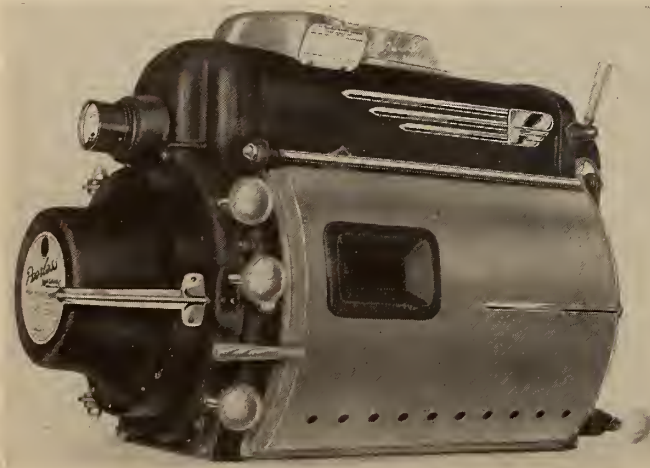
Also provided in the post-war Magnarc are two arc-crater projectors enabling the image of the burning arc to be seen from both sides of the lamp. Both the positive carbon guide and clamp enable the use of either a 7- or an 8-mm carbon without changing either part.

Magnarc 'Special' Conversion Feature

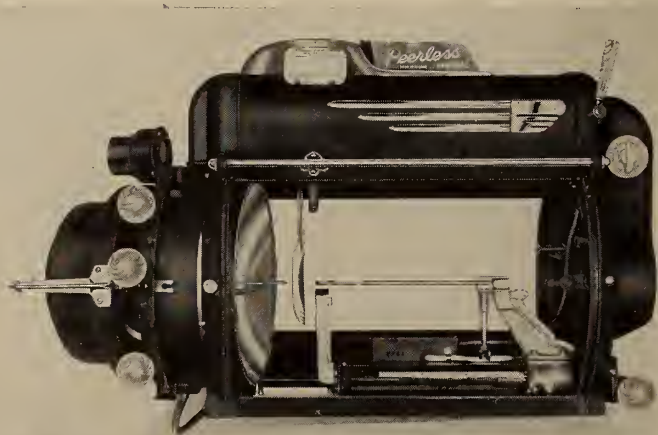
That the Magnarc Special, while designed primarily for the 1 KW, or 40-ampere, class, is truly a man-size lamp is apparent from the fact that it too follows faithfully the design features that have characterized all Magnarc arc lamps. Moreover, any purchaser of a Special who subsequently wishes to convert the lamp for a higher current rating—50, 60 or up to 70 amperes—may do so readily merely by purchasing one of two special kits.

These kits—No. 2875 for conversion to the 50-65 ampere rating, and No. 2876 for changing to the 70-ampere level—enable a speedy changeover of the lamp with a minimum of effort. The kits are available at all branches of National Theatre Supply Co. or upon application direct to J. E. McAuley at 552 West Adams St., Chicago 6, Ill.

The new Peerless Magnarc 1 KW 'Special' lamp.



Open-door view of post-war Magnarc lamp.



NITRATE FILM SYMPOSIUM

(Continued from page 12)

cause of *most* deaths from nitrocellulose fumes. Possibly reference was intended to the other oxides, the dioxide-tetroxide system, in which case I am not in a position to offer an unqualified opinion.

I readily admit the possibility that nitrous fumes may be produced in toxic concentrations, but it is my personal belief (not proved, of course) that the production of oxides of nitrogen in more than trace quantities by the combustion of film depends on conditions not ordinarily encountered in practice. I venture the *guess* that simple suffocation by a variety of fumes is responsible for most film fire deaths.

The Shea case, previously reported in IPt, is typical. It greatly resembles cases which I have encountered first-hand. These deaths are probably not due to oxides of nitrogen, and certainly not due to their delayed action, for by my critic's own admission, "its poisonous action is especially insidious in that the immediate effects may not indicate to the injured person that he is in serious danger and it may be several hours before severe symptoms develop".

Be that as it may, any rational person

† "In the Spotlight," IP for June, 1947, p. 18.

will agree completely that anyone who has been exposed to the fumes of burning film should be at once hospitalized. If nitrogen dioxide (tetroxide) poisoning has occurred, the symptoms are as described.

Camphor Content and Brittleness

IP's correspondent states that "although it is often true that very old film may be more dangerous than new film, this increased hazard would be almost entirely due to increased likelihood of breaks in the film rather than to loss of camphor".

Noteworthy here is the omission of any reference to film brittleness.

What causes increased brittleness of old film? Both the brittleness and greater inflammability of old film are due to loss of camphor (and other plasticizers) and to nothing else, save possibly deterioration of the nitrocellulose itself (which phenomenon is sometimes checked by the use of stabilizers). And, of course, brittle film breaks more readily than tough, pliable film.

Many film distributors, the U.S. Army and others "recondition" nitrate film by exposing it to the fumes of camphor. This treatment benefits film whether camphor was the plasticizer used in its manufacture or not. In my theatre experience I have many times restored very old

trailers to their original toughness and flexibility by treatment with camphor.

I have a great degree of confidence in carbon dioxide fire extinguishers *only as compared with other types*. The statement that they are "practically useless as are all other forms of fire extinguishers if a reel of film has *really started to blaze*" (sic) is unverified.

As a test I have ignited several full reels of discarded film (out-of-doors) and then attempted to extinguish them by various means. My empirical results indicate that a carbon-tet extinguisher is of no use whatever when the fire is the hottest. A stream of carbon dioxide snow (from a laboratory cylinder) extinguishes the fire slowly, presumably by virtue of its cooling effect.

Surprisingly, a bucket of water acts most effectively, immediately extinguishing the blaze. The use of water is, of course, precluded in the projection room for reasons pointed out in my original article.

[NOTE: In answer to many inquiries, IP is pleased to inform its readers that Robert A. Mitchell is a professional projectionist working regularly at his craft.—Ed.]

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THEATRE TELEVISION ANALYSIS

(Continued from page 22)

out modification) according to the usual film technique.

The advantages of such a system include the following:

It uses the normal and well-understood film projector, thus it is not necessary to train the projectionist on a new method of projection (although he or some other worker will, of course, be required to understand how to use the tele receiver, the recording camera, and the film-pro-

cessing equipment). The picture, projected readily, can be as bright as that normally shown in the theater, of the same size, and of the usual color or "whiteness."

Limitations of Intermediate Method

Further, the entire tele material can be re-run as desired for later shows at any convenient time. Thus it fits into the motion picture program with considerable flexibility. Some thought will, nevertheless, be required in connection with abuse of this system in sports events,

such as horse racing, where gambling is usual and picture delays may lead to certain abuses.

Among the limitations of the film recording process are the following: There is, as stated, a slight delay (from a fraction of a minute to several minutes) between the actual time of occurrence of the program and its reproduction in the theater. Changeover from motion pictures to tele will require considerable dexterity in the use of the available projectors. If 16-mm film is used, with resultant lower cost, different projectors will be needed. If 35-mm film is used, its cost will become a factor of some importance. Further, the expense of handling and processing the film must be considered; here it should be remembered that undoubtedly only acetate-base film would be acceptable for theatre recording of tele programs.

Other limitations involve the need for liquids for processing, heaters, driers, winding and film-transport equipment, and associated gear. Questions may arise as to jurisdiction between projectionists and cameramen. The projection room may also present space and facilities problems anent the necessary supply of water, clean air, power supplies, and the like.

[NOTE: Succeeding installments of this series will discuss other pertinent aspects of theatre tele including five possible locations of projection equipment, sound reproduction methods, color-tele methods and problems, cost factors, programming, urban and national syndication, and future trends.—Ed.]

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Three days of intensive discussions covering every phase of television's progress as well as its shortcomings will constitute the 3rd annual Television Institute which will be held at Hotel New Yorker, N. Y. City, April 19-21. An anticipated 500 television, advertising, radio and film executives from all parts of the United States and Canada will be in attendance for the 12 panel and three luncheon discussions.

Feature of the sessions will be an elaborate display of video and associated equipment which will reflect the rapid strides forward scored by this baby art during the past year and will forecast the tremendous expansion certain to occur during the coming year.

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Tele Terms and Talk

[II. Continued From March Issue]

THE appended definitions of television terms and talk are reproduced herein through the courtesy of the Tube Department of RCA. While this glossary is by no means to be considered complete, it does include those video terms most commonly read and heard.

Noise (background): The effect on the television picture of random electrical disturbances causing a grainy texture in the television image.

Optical View Finder: The device which allows the cameraman to frame and focus accurately the desired portion of the scene to be televised.

Panning (from panorama): Rotating a television or motion picture camera in either a vertical or horizontal plane, or both, to keep a moving object within picture range.

Projection Television: A method of utilizing lenses and mirrors to project an enlarged television picture on a screen.

Reflective Optics: A system of mirrors and lenses used in projection television (q.v.). Also called "Schmidt optics". Introduced in television by RCA.

Scanning: The step-by-step process of analyzing the light values of a television scene or facsimile picture for electrical transmission and for reproduction.

Spottiness: The effect on the television screen caused by the variation of the instantaneous light value of the reproduced image because of electrical disturbances between the camera tube and the picture tube.

Super-Sync: A radio signal transmitted at the end of each scanning line which synchronizes the operation of the television receiver with that of the television transmitter.

Synchronization: The process of keeping the electron beam of the television picture tube in exactly the same relative position as the scanning beam of the camera tube.

Television: The transmission and reproduction of a scene converting light rays into electrical impulses which are transmitted over wires or by radio and then converted back into light rays to form a reproduction of the original scene.

Test Pattern: A drawing containing a group of lines, circles, or diagrams, used for television test purposes.

Tilting: A vertical sweep of the television camera.

Turnstile Antenna: One or more layers of crossed horizontal half-wave antennas arranged vertically on a mast, resembling an old-fashioned turnstile. Used in television and other ultrahigh-frequency systems where a symmetrical radiation pattern is desired.

Vertical Centering: The vertical adjustment of the position of a television picture.

Vertical Hold: A manual control for adjusting the vertical scanning synchronization in television.

Vestigial Sideband: The transmitted portion of the suppressed sideband in television.

Video: A Latin word meaning "I see". It is applied as a prefix to the name of television parts of circuits which carry picture signals.

Video Frequency: The frequency of the

signal voltage resulting from television scanning.

Yoke: An electromagnetic coil used with a television camera or picture tube to produce scanning of the electron beam.



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SCREEN BRIGHTNESS DISCUSSION

(Continued from page 14)

form reflectivity within the angles encountered.

Q. What brightness is best for different density conditions of film, or what lambert will produce the best contrast value for discerning image detail? The light values alone will not give us the ultimate answer unless we have tests made with actual film strips.

A. That point is realized by the committee, but the Committee chose to consider first things first. One of the basic unknowns was the present value. Once that is determined

our activity can be enlarged to include such very pertinent questions

Q. Will not that affect the recommended foot-lambert measurement?

A. It probably will if it is demonstrated by proper tests that the standards should be changed.

Q. Could you give us a little more detail as to the type of instrument used?

A. That was a Luckiesch-Taylor visual photometer.

Q. Can you tell definitely what part of the screen you are looking at when you look through the instrument? Is it a focused image?

A. You can use either a view finder—which we did in some instances—or by locating on the screen at the same time some one is measuring illumination with a photronic cell, it is possible to tell where you are on the screen and knowing the angle of acceptance of the instrument and the distance you are, you can tell what portion of the screen you are actually measuring.

Q. Based upon your findings, especially the wide variance of percentages that you have found as conditions exist in different theatres, would you not conclude that a great deal of the fault is based upon the poor quality or outmoded use of the screens and possibly the projection equipment?

A. I do not think the Committee has done enough to take any stand at all on that.

Wide Variance in Results Cited

Q. Because of the wide variance in your percentages you can come to but one conclusion: either the screens were old, dirty, and outmoded, or the light sources projected from the projection room were not adequate.

A. Certainly if you are investigating the basic reasons for those things which were discovered, you have three factors to consider: what produces the light, what light is projected to the screen, and what is reflected. So that on a very broad generalization the reasons "why" have to be attributed to one or the other. That was not determined in this survey.

Q. I quite understand that, but I think it would be the object of your Committee to find out whether or not the equipment in use in the theatres of the country—screens, projection equipment, light sources, and everything involved—needs replacing and can very well stand it.

Point-to-Point Projection Distance

Q. One of the items measured was the projection distance, which, I noticed, was measured from the aperture to the screen. Now, I have always considered that this distance was measured from the front surface of the lens nearest the screen to the screen itself. The lens constitutes the last light source in the train.

It is true that the screen there is rather small. However, inasmuch as the foot-candles on the screen are determined absolutely by the brightness of the lens and the lens area, the effective lens area—and that varies inversely as the square of the distance—the discrepancy becomes somewhat larger. Why was the distance chosen as being from the aperture to the screen?

A. It is more a question of saying that it was from the aperture to the screen rather than a specific measurement. The determi-

nation of that distance was made by measuring from the screen to the point in the theater on a parallel under which we estimated the projector to be, and then calculating from the projection angle what the actual distance was.

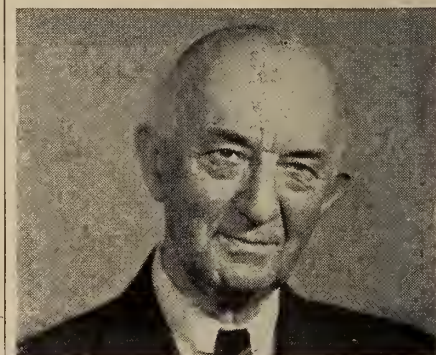
I am quite sure that those figures are not accurate to better than six inches, but even considering the shortest throw, a 65-foot throw, an error of plus or minus six inches, will be not more than one per cent.

Q. I brought that up merely for the sake of accuracy because the projection distance is actually measured from the last lens in the system, and that is the projection lens to the screen.

Factor of Screen Perforations

The second point is with regard to the relatively low values of reflection factors for these screens. Was that reflection factor determined on the basis of an integrated effect over an appreciable area of the screen which took into account the screen perforations, or was that intended to represent the coefficient of reflection of the screen surface itself, that is, the reflecting efficiency of the screen surface?

A. That was determined by taking the ratio of the brightness measured at the center of the screen to the light intensity at the center of the screen. The brightness-measuring instrument probably did not include more than an area of 1 to 2 square feet. It certainly took into consideration if there were holes in the screen as it existed in the theater at the center.



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Russian Depth Process Held Inadequate, Anticipated

THOSE readers of IP who have been following closely the development of stereoscopic motion pictures, and particularly the advances in the art reportedly made in Russia, will find especially interesting the appended excerpt from a recent book review in *Journal* of the British Kinematograph Society.

The book* reviewed was written by S. Ivanov, a Russian experimenter in stereoscopy, whose work has provided the basis for two articles in IP.^{1,2} The review follows:

The book recently published in Russia is a textbook on stereoscopy, mentioning all the well-known systems. The book also describes a special stereoscopic system developed by the author in which, broadly speaking, he takes a standard 35-mm film and, instead of using four perforation holes per picture, he uses only one perforation hole per frame. In addition, instead of the usual single picture across the film he takes two smaller nearly square pictures which extend into the normal sprocket hole area and are separated by the sound track, which is positioned between the two pictures in the centre of the film.

There are no special attachments for the viewer when the film is projected, but the screen employed uses a lenticulated grid system.

Insufficient Light for Large Theatre

From other publications available it appears that this system is installed in a small cinema in Moscow having a seating capacity of 200. Apparently, however, the question of sufficient light is important, and from latest reports it seems that the Russians have now gone over to using two standard

* "Grid System Stereoscopia in the Cinema," by S. Ivanov (Moscow).

¹ "Russia's Three-Dimensional Motion Pictures," by S. Ivanov: IP for April 1941, p. 12.

² "Startling Soviet Stereo Films"; IP for December 1947, p. 17.

films which are run in synchronism.

The Russian proposal is interesting and shows practical results, but, as already mentioned, only for a small cinema. It is very doubtful whether in any larger cinema the amount of light would be sufficient.

It is also very interesting to note that, as so often happens, Ivanov's idea is really a re-invention of a previous idea. A comparison of French Patent Specifications Nos. 666,361 of Edmond Noaillon filed in 1928 and 885,032 of S. Pavlovitch Ivanov filed in 1940, shows that Noaillon had put the same idea on paper twelve years before Ivanov.

Francis Doublier, Film Pioneer, Dies

Francis Doublier, 69, pioneer newsreel cameraman, died April 3 at Fort Lee, N. J. Born in Lyons, France, Doublier began his career in 1895 at the age of 16 with the Lumiere Brothers, inventors of one of the first projectors. Four years later he quit the movie business because he saw no future in it.

The first great event Doublier covered was the coronation of Czar Nicholas II in 1896. In 1902 the Lumieres persuaded him to set up a laboratory in Burlington, Vt., and he remained in the technical end of the business the rest of his life. Although an intimate of the great and near-great in the film world, Doublier never went to Hollywood.

Doublier was a charter member of the Picture Pioneers, a member of the SMPE, and a honorary member of the 25-30 Club of N. Y. City.

Photography Proves Theory

The theory known as the "Einstein shift"—which states that the light rays from stars are bent by the sun's gravitational pull as the light rays approach the earth—has just been proved with the aid of special photographic plates developed by Eastman Kodak Co. Used during observations of the total eclipse seen recently in South America and Africa, the plates provided the basis for measurements which definitely prove what has heretofore been only a theory.

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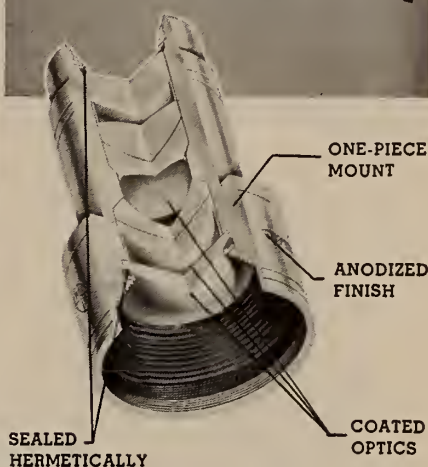
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More on 'Quality' vs. 'Pleasing' Sound Reproduction

PROCEEDING apace is the warm and always interesting discussion among technicians as to the public preference for quality sound reproduction whether by phonograph, by radio, or through the medium of the sound motion picture.^{1,2} Latest entry in the fast-growing bibliography on this topic is an editorial in *Audio Engineering*,³ presented here in part:

From England, an engineer writes that we

¹ "Quality" vs. "Pleasing" Sound Reproduction," by J. Moir; *IP* for February 1947 (p. 5) and May 1947 (p. 16).

² "Addendum: 'Quality' vs. 'Pleasing' Sound Reproduction; *IP* for November 1947 (p. 37).

³ "More on Hi-Fi"; *Audio Engineering* for February 1948 (p. 3).

shouldn't call an amplifier "high fidelity" unless the harmonic distortion is kept down to around 1/10 of one per cent and the frequency response flat to within one db from 20 to 20,000 cycles. Another writer maintained that his amplifier had to be designed to boost both lows and highs far above the middle register to give him satisfactory reception. . . .

Parallel in Many Other Fields

What we really want is "pleasing" reception, whether or not it is high fidelity, and we can't escape the fact that even a pleasant voice might sound awful if the speaker got too close to the mike, especially if exactly reproduced.

All this has its parallel, of course, in other fields. A couple of decades ago, the same controversy arose in photography. Portrait

photographers didn't like high grade anastigmat lenses because they brought out every pore and blemish in the skin, details which were not normally noticed when directly viewed by the eye. A fad arose for partially corrected lenses, chiffon diffusers, and other means of softening the details.

In some cases, these expedients did give more pleasing pictures, but these devices have largely disappeared with the advent of better photographic materials and improved techniques in lighting and finishing processes.

Because a reduction in sound power causes a far greater decrease in the loudness of the lower frequencies (and, to a lesser degree, the higher frequencies) than those in the middle register, due to the characteristics of the human ear, it has been argued that some compensation is necessary when reproducing sounds at a lower power level.

Compensation For Lower Power Level


This is not necessarily true. The sound power developed by a large orchestra, for example, is far greater than that produced by the average radio. But the orchestra would normally be spreading this acoustic power over a much greater area than that covered by a home radio when operated in a living room.

Thus the radio could reproduce in the home orchestra music with much less sound power, yet give the same degree of loudness as would be experienced by the listener to the orchestra at some point in a large auditorium. Therefore no bass boost is necessary unless the listener operates the reproducing equipment so that the music is not as loud as it would be if he were listening to the orchestra directly in an auditorium.


Distortion Reduction Main Objective

Engineers who test loudspeakers are often somewhat amused at the efforts of designers of amplifiers to make the electrical response flat to within a fraction of a db over a wide frequency range, because the speakers to which the amplifiers connect have such jagged response curves.

Actually, if uniform frequency response were the only consideration, the care would not be worth the trouble. But in making the frequency response flat, distortion is also reduced, so that a fine amplifier does enable better reproduction from the same speaker than could be secured from a mediocre design.



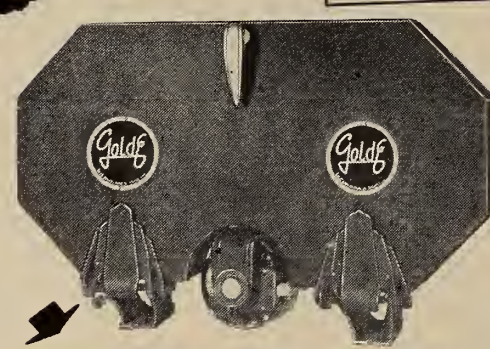
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HERE is a detailed and non-technical manual for business executives, sales managers, personnel managers, and others concerned with the application of visual aids to the problems of industry. The book is a practical guide to modern practices in the use of the non-theatrical motion picture and slidefilm. Fully illustrated, and containing numerous case histories, the book discusses the various ways in which visual aids can be profitably applied to your individual business needs—training personnel, advertising products, promoting safety campaigns, etc.

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New Motio St. Louis Dealer

Motiograph announces the appointment of Mid-States Theatre Supply, Inc. (formerly L. T. Rockenstein Co.) as the exclusive dealer for Motiograph projectors and Mirrophonic sound systems in the St. Louis area. Mid-States is headed by Morton S. Gottlieb and Harold Block, both of whom were active as officials in the predecessor company.

Longest Photos in World

The longest photographs in the world—100 feet long and 16-mm wide—can be made with the microfilming machines produced by Recordak Corp., a subsidiary of the Eastman Kodak Co. The Recordak will photograph 3,500 feet of adding machine tape in one continuous strip.

Emergency Amplifier Hookup

Many and varied are the emergency systems rigged by projectionists as a form of show-insurance in the event of failure of a particular unit. One of the most interesting of these setups is that conceived by John P. Flaherty, projection supervisor for the Fourth Avenue Amusement Co. of Louisville, Ky., and chief at the Strand Theatre in that city. John, incidentally, is also the B. A. of Local 163.

John's hookup (an assist for which he magnanimously credits to R. T. Van Niman,

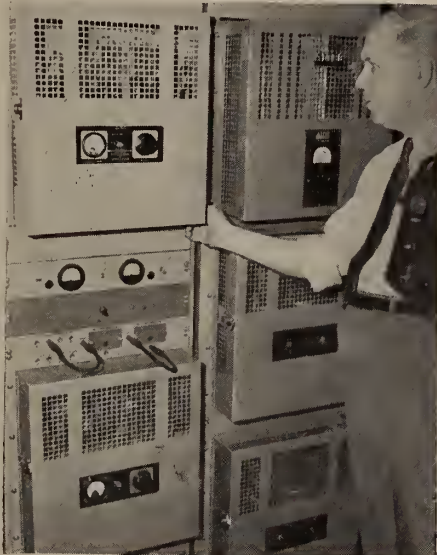


Photo by Falls City Theatre Equipment Co.
John Flaherty looks over his trim amplifier rack installation.

chief sound engineer for Motiograph) provides for powering the loudspeaker system six different ways. He can use the No. 1 15-watt driving amplifier or the No. 2 15-

watt driving amplifier, or a combination of both to produce 30 watts; or he can use the No. 1 unit or the No. 2 unit to drive the 75-watt main amplifier. To use any one of the combinations of his choice he need only flip a switch or plug-in a jack located on the front of the amplifier rack.

On the front wall of the room there are mounted two pre-amplifiers, either of which may be used by merely flipping a switch; and of course either pre-amplifier may be operated from either projection position. Also provided are two separate power units for d. c. supply to the exciter lamps, also rendered operable by merely flipping a switch.

All main amplifier tubes may be instantly checked as to operating condition by either a push-button or coin-operated panel switch, which provides a quick and easy way for determining whether everything is shipshape.

GPE Reports Record 1947 Sales

General Precision Equipment Corp. reports consolidate net profit after taxes for year ending December 31 last of \$1,242,027, as against \$1,742,694 for previous year. Lower earnings in 1947 despite record sales high of \$27,748,137 is attributed to absence of tax refunds as in 1946.

GPE subsidiaries include National Theatre Supply, International Projector Corp., Strong Electric Corp., J. E. McAuley Co., Hertner Electric Corp., and Ampro Corp. President of GPE is Hermann G. Place, who succeeded Earle G. Hines, now chairman of the board.

'Shoot' 100-M.P.H. Landings

Lockheed Aircraft Corp. has completed a new test rig which makes it possible to simulate 100-mile-an-hour plane landings and record shock absorbing qualities of struts, tires, and runway. As test landing gears are checked with the new rig, high speed mo-

tion picture cameras photograph the gears during the moment of impact. This enables the engineers to study many aspects of the effect of impact and to locate weaknesses of designs or materials.

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FRANK PANERO—President, Panero Theatre Co., Inc., (14 theatres), Delano, Calif.—declares:

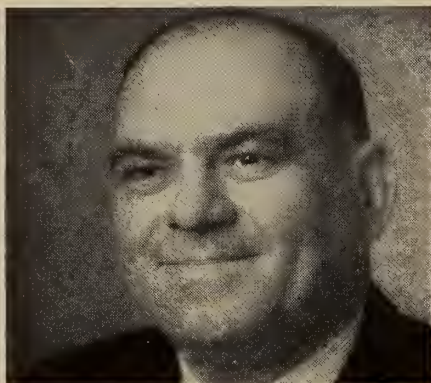
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Craft Conditions in Africa; Term 'Operator' Draws Editor's Rebuff

Projectionist wages in South Africa are not so forté, according to a communication from a service engineer there to the tech-



ADOLPH FARKAS—Part Owner and General Manager, Lyric and Rialto Theatres, Johnstown, Penna.—writes:

"RCA Service keeps our sound in peak of condition at all times. We recommend RCA Service very highly."

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nical editor of the British *Ideal Kinema*. This engineer, addressing British projectionists who wished to emigrate to S.A., said in part:

"One is legally bound to hold an operator's license before he can take over in this country. The working conditions are excellent, but a good operator only commands 8 or 9 pounds (approximately \$40 to \$45 in American funds), as against, say, 15 to 18 pounds (\$60 to \$72) for an artisan tradesman." High prices and shortage of living accommodations are also cited as problems.

Noting the use of the term "operator" instead of "projectionist," the *I.K.* editor cites the opinion of a colleague that the former term is "more practical and more manly than the supercilious 'projectionist'" and observes:

"I must confess that the word had never occurred to me as being supercilious, but merely a true description of his functions. An 'operator' may operate anything from a cine camera to a sewing-machine; in America he operates the kinema itself—he is, in other words, the proprietor. All very good reasons for retaining the word 'projectionist'."

Flexible Photo Plates by Eastman

Large photographic glass plates so thin and flexible they may be bent into a section of a sphere without breaking are now being produced by Eastman.

Made for use with the world's largest

Schmidt-type telescope—which snuggles alongside the giant 200-inch 'scope atop Mt. Palomar—the plates are made with glass 40-thousandths of an inch thick which can be bent into the required spherical curvature to properly record the rays from the 48-inch Schmidt telescope mirror.

The plates, 14 x 14 inches, are coated with emulsions which are intended for extremely long exposure.

TESMA-TEDPA Show Space Bookings

Booth space for the joint TESMA-TEDPA trade showing will be somewhat lower in cost, according to Roy Boomer, secretary. In a prospectus for the show to be issued shortly, Boomer cautions all exhibitors and others who plan to attend the show that both personal accommodations and exhibit space are going fast and that prompt action on reservations is indicated.

Outlet for Commercial Film

A new means of distribution for industrial, educational, promotion and advertising film is now being offered by a San Francisco neighborhood movie theatre. The theatre is available for rental from 8 a.m. to 5 p.m., but after 5 reverts to typical Hollywood fare.

Heavy Kodak Research Staff

Although more than 500 people in the Kodak Research Labs. devote full time to experimental research and the improvement of processes and products, that total represents only a portion of the research personnel of Eastman Kodak Co. Scores of additional technicians are employed in all major production divisions of the company.

'Snipping' Film Credits Banned

Film distributors have warned all exhibitors that snipping picture credits from feature prints in order to save running time is a violation of exhibition contract, which provides that picture must be shown in the form delivered.

Favor Supplemental 16-mm Units

H. & E. Balaban circuit of 32 theatres in Chicago area contemplates going to a 16-mm shorts program for afternoon sessions, supplementing regular 35-mm fare. Meanwhile, the Associated Theatre Owners of Indiana recommends in its current house organ that members install 16-mm equipment alongside present 35-mm setups in projection rooms.

Engineering Drawings Copied

In order to reduce storage space and to simplify the production of various sized enlargements of their engineering drawings, United Air Lines has instituted a policy of copying all engineering drawings photographically. By means of enlargements, the negatives are then used to produce different size and scale drawings on film for shop use.

3-Way Protection FOR YOUR BOOTH



EMERGENCY REPAIR PARTS Every National Branch has a stock of emergency repair parts for quick replacement.



MAIL ORDER PARTS STOCK National is delivering the genuine Simplex parts projectionists need, proved by shipments over the past six months greater than ever before.



LOAN SERVICE EQUIPMENT Emergency loan equipment more complete than ever, ready for use when you need it.

Today National Theatre Supply provides protection for you on three fronts—our contribution to better projection equipment maintenance. More than 20 years' experience in helping projectionists keep the show on is your assurance that National is Booth Protection Headquarters!

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BOOK REVIEWS

TELEVISION ENCYCLOPEDIA, by Stanley Kempner; 415 pages, 37 illustrations, 5½ x 7½, cloth. Fairchild Publishing Co., N. Y. City. \$6.50.

This is the first, non-technical reference book ever compiled on television in all of its major aspects. With the aid of a group of television authorities, the author has gathered innumerable facts on the television industry which heretofore were available only in diverse sources. Here, for the first time in one volume, can be found a comprehensive presentation of material which includes:

An historical survey of television in the form of a chronological record of its evolution out of earlier research in electronics, tracing television progress from 600 B. C. to 1947;

Biographical sketches of pioneers and contemporaries in the fields of science, entertainment, information and commerce, who have helped to bring television to its present maturity;

A glossary of technical and trade terms—not merely definitions, but semi-technical, simply-worded descriptions of the operation, construction and programming techniques of television;

An appendix on "The Urban Market for Television" (a survey of television's merchandising prospects); and

An extensive television bibliography, valuable for research of a more specialized nature.

This book provides a handy source of reference and research for all members of the radio and television industry, in any of its phases.

MAGIC SHADOWS, by Martin Quigley, Jr. 191 pages, illustrated, 9 x 6, cloth, with chronological and bibliographical appendix, indexed. Georgetown University Press, Washington, D. C. \$3.50

Apropos indeed is the sub-title of this work, "The Story of the Origin of Motion Pictures," for the author obviously has given prodigally of time, money and effort—interlarded with perseverance and a strict objectivity—to probe into and extract from hitherto uncatalogued, if not actually unknown, sources of data bearing on the development of the art. No muck-raking foray is this, however, for the author reports with complete candor and an apparent dispassionateness the facts as he unearthed and interpreted them.

This book riddles the notion that motion pictures had their inception in the mid-19th century and gradually evolved at an ever-quicken pace into the dominant art

Visual Education—By Mail

The advantages of visual education are being brought even to correspondence school students these days by a radio correspondence school in Chicago. The school loans students a projector for home use and provides 16-mm training films which explain the principles of radio and electronics,

that it is today. Mr. Quigley—who, incidentally, is associate editor of *Motion Picture Herald* and *Motion Picture Daily*—traces the course of the cinematic art all the way back to Aristotle and Archimedes and evidences his personal belief that many minds and many hands through the centuries contributed substantially thereto.

Mr. Quigley does lay to rest several ghosts which have been stalking through the motion picture museums for many years, notably that fiction which credited Thomas Edison and his contemporaries with "inventing" motion pictures. For this scholarly work is based almost wholly on original documents and other unassailable source material and is buttressed by a formidable bibliography.

This book is a credit to the author and to the publisher, and it measures up as a vital contribution to the literature of an art which has probably been the victim of more misconceptions than any other field of endeavor.

FUNDAMENTALS OF PHOTOGRAPHIC THEORY, by Thomas H. James and George C. Higgins (Kodak Research Labs); Eastman Kodak Co., available through all Kodak dealers, \$3.50.

This is a fascinating, compact study of the photographic process which takes the reader step-by-step from basic terminology through the composition and preparation of the emulsion, latent image formation and its development, the chemistry of developing and fixing, sensitometry, the measurement of film speed, graininess and granularity, resolving power, tone reproduction, development effects, and up to such special topics as the spectral absorption of photographic materials.

Purpose of the work is to give a general account of the theory of photographic procedure, based upon the fundamental chemical and physical concepts. A basic knowl-

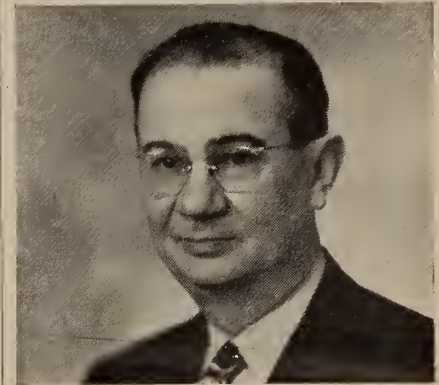
edge of chemistry and physics is presupposed, but a specialist's knowledge in these fields is not required.

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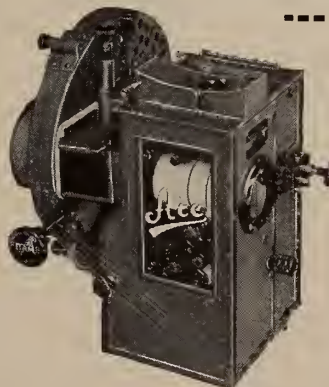


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Proper Care of Burns

The appended data anent the proper treatment for burns is approved by the Red Cross and other recognized agencies.

BURNS are classified according to degree, that is, the depth to which the body tissues are injured. Burns are classified as follows: first degree: skin reddened; second degree: skin blistered; third degree: deeper destruction of tissue, as charring or cooking. Shock and infection are the chief dangers from burns.

In first degree burns the danger of infection is not as great as in deeper burns, but the pain is often marked. Any good burn ointment may be applied to such burns.

In the case of deep burns, do not apply an ointment, but rather simply cover the burn with a sterile dressing and take the victim to a physician or the nearest hospital. If a sterile dressing is not at hand, an improvised dressing several layers thick may be used, although the more nearly sterile the material is, the better.

In the case of massive burns, the best procedure probably consists of wrapping a sterile or clean sheet about the victim over the clothes, covering him adequately and taking him to a hospital or to a physician.

When Clothing Is Afire

A person whose clothes are on fire must not run or remain standing. Running fans the flames; standing makes him likely to inhale the toxic fumes. Throw the victim down, if necessary, and smother the fire with coats, blankets or rugs, smothering from the shoulders toward the feet.

If your own clothing catches fire, roll

up in a blanket or rug, with your head uncovered, and thus smother the flames. If there is no such material at hand, lie down, roll over slowly and use your hands to help beat out the flames.

For burns of limited extent apply sterile petrolatum or burn ointment over burned area. Over it place a layer or two of gauze, as from a sterile roller bandage, and bandage over this with a roller bandage. Take patient to doctor for further treatment.

Shock to Be Guarded Against

With extensive burns shock is always present. Keep the patient lying down with his head down and avoid exposure or cold. If the patient got his burn in a fire, don't attempt to treat it locally. Leave his clothing on and cover him

What NOT To Do

1. Never apply iodine to a burn or scald.
2. Don't use oils and greasy ointments in cases of severe burns.
3. Don't use boric acid for first-aid treatment of burns.
4. Never use absorbent cotton directly on a burn.
5. Don't use tannic acid on face, hands or genitals.
6. Never open large blisters.

with blankets and get him to a hospital as quickly as possible.

Remove all loose clothing from the burned area, but not if it sticks to the burned area. Cut around it and leave the adhering clothing for the doctor to remove. If the burn occurs at home, dip strips of clean, freshly laundered sheeting into a solution made of warm tap water, one quart containing three tablespoons of baking soda, and apply to the burned area. If baking soda is not available, epsom salts may be used in the same proportion.

Keep Patient Covered, Warm

Keep the patient covered and warm until the doctor arrives. This leaves the doctor an opportunity to treat the wound as he chooses and the wound will be as little contaminated as is possible.

If you have to care for an extensively burned patient for some time before a doctor comes, water should be given to the patient in small drinks at frequent intervals.

When clothing catches fire, don't run . . . it fans the flames. Tear off the burning clothing, if possible, or smother it by wrapping about the body any heavy woolen cloth within reach. Never try to smother a fire with cotton clothing or blankets because cotton burns quickly.

The best way to smother the flames is to throw the person whose clothing is on fire to the floor and cover him with a

MONTHLY CHAT

(Continued from page 3)

to back down a bit, the foregoing seeming to have impressed him as red-hot news.

There's no intent on our part to give projectionists a pass on the score of hacking up a reel of film by affixing their own cue markings. Even the most conscientious projectionists are apt to bear down a trifle too hard on the marking scribe, and not a few theatres lack an approved means for affixing such marks, thus leaving the projectionist to his own devices and practically forcing him to resort to crude freehand markings. And there is that ever-present minority of lazy ones who won't exercise their eye muscles much less their torsos.

Projectionists in the aggregate don't warrant the criticisms leveled at them by unthinking people who don't know the difference between a photocell and a rheostat, and much less should they be tossed about by people in this business who should know that in the fantastic world of make-believe that is motion pictures all that glitters positively is not gold.

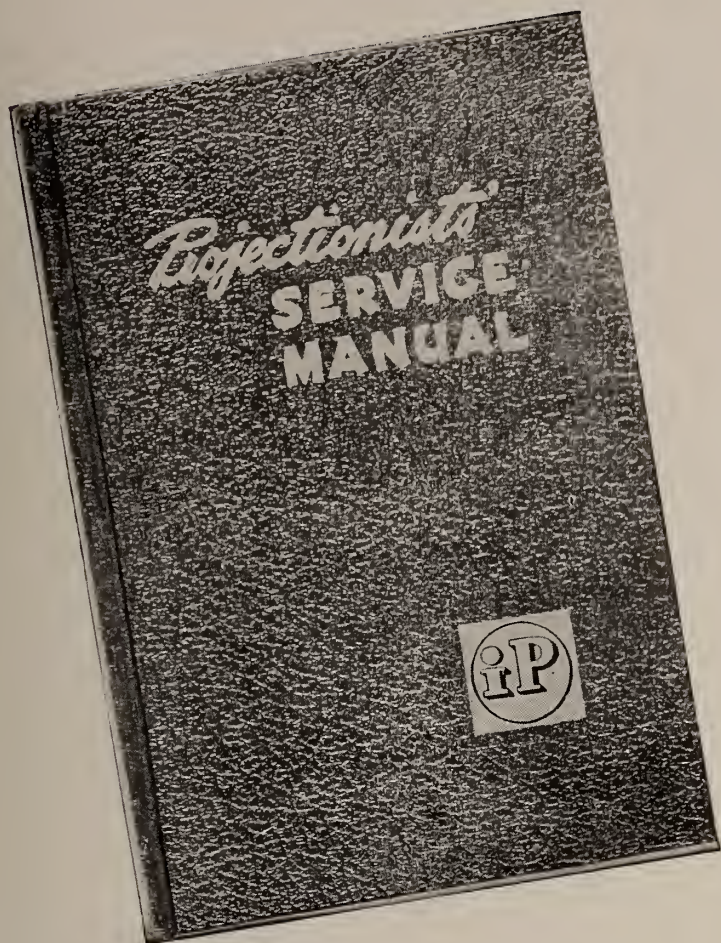
To one and all, and particularly to our "friends" within the industry, we say this: put it on the film and we'll put it on the sheet. People go to the movies to see them and not to play games via the optic-nerve route. Not even a 1000-amp arc will illuminate nothing.

rug or other woolen material, throwing it downward toward the feet in order to keep the flames from the face. Always remember that the flames must be kept from the face.

Give...



This is the symbol of American Overseas Aid-United Nations Appeal for Children now underway to raise \$60,000,000 to help feed the world's hungry children. The globe represents the United Nations; the child is symbolic of starving children in desolated nations. The outstretched hand across the world offers America's help. Give generously to your local Crusade for Children, or AOA-UNAC, national headquarters, 39 Broadway, New York 6, N. Y.



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complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only \$3 per copy, postage prepaid.

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Translated into United States currency, it runs something like this:

"Annual income, two thousand dollars; annual expenditure, nineteen hundred and ninety-nine dollars; result, happiness. Annual income, two thousand dollars; annual expenditure, two thousand and one dollars; result, misery."

Mr. Micawber was only half-right!

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Join the Plan you're eligible for today! As Mr. Micawber would say: "Result, security!"

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HENRY B. SELLWOOD, *Editor*

Volume 23

MAY 1948

Number 5

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MONTHLY CHAT

THE big noise in projection during the past month was the long-anticipated sneak unveiling by Paramount of its theatre television system which has been in readiness for many months at the circuit's flagship theatre in Times Square, New York. The process adhered in all particulars to the well-publicized Paramount formula for such exhibitions, a recapitulation of which follows:

Video cameras picked up an amateur boxing show at the Navy YMCA in Brooklyn and, via a special microwave frequency (7000 megacycles) transmitted the images to a pickup tower atop the Daily News building in New York. The latter relayed the pictures to the top of the Paramount building in Times Square, whence they traveled down a coaxial cable to a special processing room at the ninth floor level adjacent to the theatre projection room.

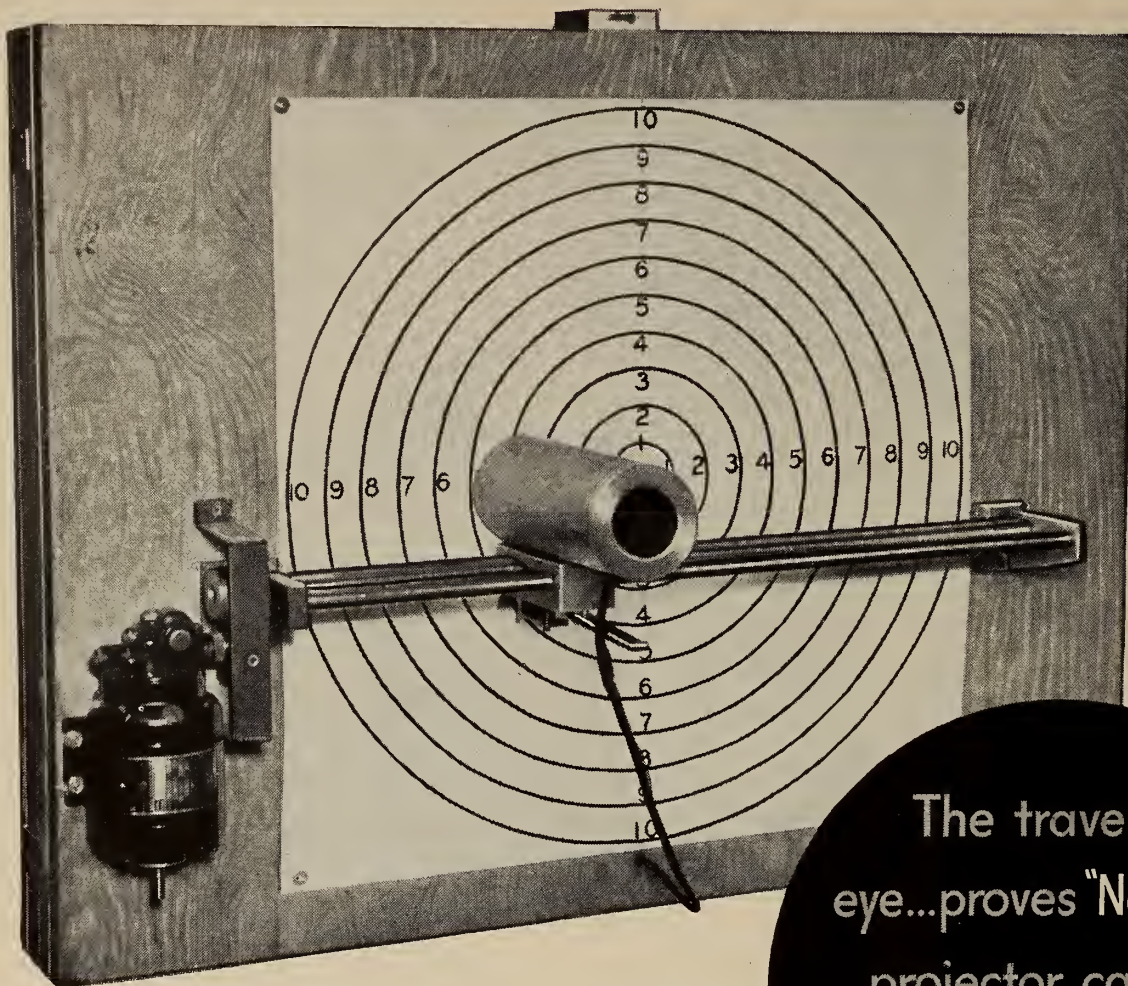
Here a specially converted Akeley camera focused on the face of a regular television receiver "shot" the images with 35-mm film, with the latter then being run through the rapid processing equipment which developed, dried and readied the pictures and accompanying sound for regular projection within 66 seconds from the time the images appeared on the television receiver cathode ray tube.

Projected by the regular visual and sound reproducing equipment, the theatre screen image approximated 18 by 24 feet and in terms of quality was adjudged not so good, being inferior to the newsreel release standard. A tight programming schedule was set up in advance, of course, with the tele-film images hitting the theatre screen at exactly 9:45 p.m. following a brief announcement to the startled audience. The applause which followed the showing was induced almost entirely by the novelty of the presentation rather than by any intrinsic merit of the show.

Paramount indulged in beacoup chest-puffing following the event, with its video vice president, Paul Raibourn, announcing that "this is only the beginning and presages many other theatre tele showings in Paramount houses in New York and elsewhere." Raibourn disclosed that Paramount has an FCC license for microwave relays in New York City, with applications pending for similar rights in other locations. Transmission over the Paramount wavelength cannot be picked up by other television stations or by home receivers, thus programs may originate in other cities and be transmitted by coaxial cable to any theatres on the cable circuit.

Raibourn announced that none of the equipment used in the process will be offered for sale to other companies until Paramount has fully satisfied its own needs in various cities; but the units employed for this purpose are available through several other sources. Citing

(Continued on page 34)



The traveling
eye...proves "National"
projector carbons
REALLY ARE
BRIGHTER

How bright?

That is the \$64 question in movie projection, because crater brightness is the key to screen brightness, audience approval, and big box office.

National Carbon Company answers the question with the "traveling eye," shown above. With scientific accuracy, this photoelectric cell in the metal tube, traveling across the actual crater image, measures the brightness of the "National" High Intensity arc. Results show that the brightness of "National" carbon arcs rivals that of the

sun itself!

This means that by using "National" High Intensity projector carbons you obtain the brightest light available for movie projection. At the same time, you obtain light with a nearly perfect color balance. Your color movies glow with rich vividness! Your black-and-white pictures sparkle! Good business!



WHEN YOU ORDER
PROJECTOR CARBONS —
ORDER "NATIONAL"!

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Kansas City, New York, Pittsburgh, San Francisco



Optical Efficiency in Projection

THE various optical units of a motion picture projector—light source, condensing system, film plane, and objective lens—are closely integrated. The faulty functioning of any of these elements reduces seriously the efficiency of the projector. The rotating shutter, too, may advantageously be considered in an examination of the optical train, for in function it is essentially a “light-valve.”

Moreover, two additional optical elements, the projector port glass and the screen, even though external to the projection machine, influence the final result of the projection process too profoundly to be ignored.

Light, except when refracted by lenses or reflected by mirrors, travels in straight lines. It will not bend to accommodate a misaligned projector optical train.

Optical Lineup Critical

When the optical train of a projector is lined up properly, the centers of the various elements—the crater of the positive carbon, the mirror (or condenser), the aperture, and the projection lens—will lie in a straight line. If this imaginary straight line is sufficiently extended, it will intercept the screen very close to its center. This is the *optical axis* of the projection set-up.

Adjustment of the optical train is accomplished by adjusting the position of the lamphouse and lamp parts. The position of the lamphouse must be adjusted laterally and vertically so that an aligning rod passed through the centers of the projection lens holder and the aperture will also pass through the positive carbon holder and the center of the reflector. Many projectionists use a tightly

By ROBERT A. MITCHELL

stretched string to check the alignment.

If no vertical adjustment is provided on the lamphouse table or support, the burner and mirror supports inside the lamp will have to be moved up or down to bring the carbons and mirror into line; but if this is impossible, shims or special adapters may have to be used on the lamphouse table. Lamp alignment should be checked frequently.

Light Source Characteristics

In the d-c arc it is the crater of the positive carbon that possesses prime optical significance. Crater characteristics are influenced by the following factors:

1. Type of positive carbon.
2. Type of negative carbon.
3. Diameter of positive carbon.
4. Diameter of negative carbon.
5. Characteristics of power supply.
6. Arc distance.
7. Position of negative carbon relative to positive.
8. Influence of magnetic field on arc stream.
9. Influence of drafts on arc stream.

A radical change in the size of the carbons necessitates a change in the power delivered to the arc. A departure from the recommended ratio of positive-to-negative carbon diameter will introduce feeding and other difficulties.

The arc power may be controlled within certain limits by the projectionist. There is always the possibility that the current source is not matched to the lamp (that is, the volt-ampere characteristics of the source may not be suitable

for the type of lamp used); but assuming that the proper power source is in use, there are usually at least one or two adjustments that may be made.

In the case of nearly all generators the *voltage* may be altered (without affecting volt-ampere characteristics) by means of a field rheostat, and the available current (amperes) may be limited by a resistance unit interposed in the arc-generator circuit. This unit is a necessity when the usual parallel-type generator is employed because of its stabilizing effect on the arc. Hence it is called a “ballast rheostat.”

When there is insufficient ballast resistance the arc will exhibit a troublesome tendency to be extinguished by slight drafts, and it may even “snap out” spontaneously. Most arc rectifiers do not require ballast rheostats.

The arc distance, or gap length, is a matter of considerable importance, especially with low-intensity arcs. Bear in mind always that a variation in arc gap causes a change not only in the current but also in current characteristics. An alteration in the ohmic value of the ballast resistance may necessitate a slight change in the gap length.

Negative Carbon Positioning

In any case, the proper gap length for the arc must be determined by experiment under actual working conditions, and this length must be meticulously maintained during projection to avoid an unstable arc or a decrease in light.

The positioning of the negative carbon determines the angle of the positive crater and, in the case of the high-intensity arc, the intrinsic luminosity of

the crater. In all arc lamps the positive crater must face the collector (mirror or condenser) squarely if optimum results are to be obtained. The angle at which the positive crater burns should be checked frequently during projection, and the position of the negative adjusted to keep the crater formation perfect.

The last two factors listed concern external influences on the arc stream. These may be harmful or beneficial. In the non-rotating type of high-intensity arc an auxiliary magnetic field is introduced to reinforce the natural field produced by the arc current. The effect of magnetic flux may be demonstrated by bringing the tip of a magnetized screw-driver close to a burning arc and observing the repelling effect on the tail-flame.

So sensitive is the arc stream to magnetic influence that instructions regarding the supplementary magnets must be rigorously observed to insure proper formation of the ionized gas ball in the positive crater of the arc.

Arc-disturbing drafts in the lamphouse give rise to serious operating difficulties, with both low- and high-intensity arcs producing a flickering light. The vent-pipe dampers may be closed off, of course, but this procedure permits poisonous arc fumes to endanger the projection crew¹. A better plan is to have the vent system remodelled for satisfactory operation. If the theatre owner refuses to comply, the powers of the local Board of Health or of an industry-labor board may be invoked.

Heat-resistant glass discs should be placed over the lamphouse cones when air-circulating rear shutters are used; otherwise the use of protective glasses should be avoided. Even when clean, these glasses absorb from 5 to 10 percent of the light.

The Condensing System

If all electrical and mechanical conditions are such that a perfect positive crater of maximum brilliance can be maintained, the next step is to examine the functioning of the light-collecting and -converging system—the reflector or condensing lenses.

Because a mirror can reflect only the light that it intercepts the importance of maintaining a perfect crater is obvious. It is possible, however, that the mirror is not reflecting light efficiently. These factors govern the performance of a mirror:

1. Reflective power.
2. Transmission of the glass.
3. Diameter of the mirror.
4. Focal length.
5. Parabolization.

The reflective surface of an arc-lamp

mirror is a thin film of silver or aluminum on the rear surface of the glass. This film reflects from 85 to 95% of the visible light falling upon it. The two-way transmission of light by the glass is seldom greater than 96%, and it is greatly decreased when the surface is soiled by carbon dust, core dust, etc. A dirty mirror may reflect less than half the light it intercepts. In addition to decreasing the efficiency of the reflector, a coating of core dust discolors the light.

The pitting of mirrors by particles of carbon thrown out from the crater seldom occurs in low-intensity lamps. In high-intensity lamps, however, pitting is unavoidable, and the emission of carbon particles from the arc continues all the time the arc burns. At the time of striking the arc droplets of molten copper may be thrown onto the reflector. If the arc is struck inexpertly, violently-ejected carbon vapor condenses on the mirror in the form of black soot; but this is easily wiped off and does not injure the surface of the glass.

On the whole, even moderately severe pitting does not affect the performance of the reflector nearly so seriously as does core dust.

Optical Surfaces Cleanliness

Even though the projectionist is unable to prevent pitting, it is his duty to keep the mirror clean at all times. Particles of copper and carbon can be removed from the surface of the glass by means of a razor blade or the edge of a copper coin. The white core dust should be wiped off with a soft, dry cloth after every hour of projection.

Because core dust contains basic oxides of rare-earth metals, it exhibits a pronounced tendency to "eat" into the glass, especially when hot, thus making it difficult to remove when it has been left on the mirror for a long period of time. When the dust does not wipe off easily, the reflector must be removed and scoured with Bon Ami or lens-cleaning paste on a moistened cloth.

Care must be exercised not to wet the back of the mirror. Ammonia solutions should never be used for cleaning mirrors, as the fumes may work through the backing and adversely affect the silvered surface.

A mirror, like a lens, has a focal length which governs the "working distance" (mirror-aperture distance) and the "arc focus" (mirror-crater distance). The elliptical or parabolic "figure" of the reflector is intended to be such that a reasonably sharp image of the positive crater is thrown on the aperture plate when the correct working and arc distances are employed. If the degree of parabolization is insufficient, spherical aberration results with a consequent "hot spot" and fadeaway.

The projectionist will find it worth

while to adjust by trial and error the mirror-aperture distance until that point is located where screen illumination is brightest and has no objectionable fadeaway². In cases where fadeaway persists at every practicable setting, the size (geometric speed) of the projection lens may be inadequate.

Condensing lenses usually consist of two elements, the collector and the converger. Such lenses may be cleaned by methods previously given for reflectors.

Aperture and Film Plane

Next to be considered is the aperture, or, rather, the film plane over the aperture. We can profitably examine the light shield which is interposed between the cooling plate and the lamphouse light cone in front-shutter mechanisms. In many instances the older type light shields are too narrow to accommodate the full width of the light beam from a reflector arc, hence produce a fadeaway at the vertical edges of the screen image. In such cases light shields of adequate size must be substituted.

Flatness of the film over the aperture is absolutely essential. Any movement of the film to and from the projection lens is tantamount to moving the lens itself in and out of focus. The effect of badly buckled film cannot be "cured," but it may be minimized by having a perfectly straight film course (this involves the lateral positions of all sprockets in the head and of the gate itself), and by replacing gate film tracks and gate-door tension pads whenever they evidence wear.

An even or similar degree of tension must be exerted on both edges of the film, but, strangely, the precise degree of tension of the pads, so important in many ways, has little influence on the in-and-out of focus effect of buckled film.

Worn film tracks in the gate are exceedingly bad because they distort the film plane sufficiently to preclude the possibility of obtaining a sharp focus over all the screen. The tracks should be checked occasionally with a short steel straight-edge.

The rotating shutter, no matter what its construction or position in the projector, has but one function, that of providing a cutoff of light while the intermittent sprocket moves, and a balancing cutoff during the middle of the intermittent's rest period. The utilization of the shutter as a fan or air-circulator to cool the gate is of questionable value.

If the shutter is mis-timed, the streaky effect known as "travel ghost" will appear. If the shutter be "early" (opens the lens before the film has stopped) the ghost appears to extend downward from bright objects in the picture; if it be "late" (the

(Continued on page 26)

¹ See "Toxicity of Carbon Arc Gases," Leroy W. Latowsky, M.D., IP for February, 1948, p. 10.

² See "Complete Projection Data Charts, II," IP for May, 1947, p. 13.



He makes the most of moonlit moments . . .

IT'S mighty important to star . . . director . . . movie-goer . . . to have this moonlit moment come alive upon the screen.

And when it does—in all its subtlety of mood in light and shadow—the credit's due in no small measure to the important contribution of the laboratory control engineer.

For his knowledge of photochemistry, his "eye" for photographic quality . . .

his vigilant control of printing density and contrast . . . do much to make moonlight footage *look* like moonlight, and help to bring out the best in every frame of film.

Quality of film contributes, too; and this important assistance the laboratory control engineer is sure of when he works with the famous Eastman family of motion-picture films.



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Screen Data: Types, Sizes, Illumination for 35- and 16-mm Film Projection

THE respective reflectance characteristics of motion picture screens determine the conditions under which the four general classes can be used to satisfy approved brightness recommendations.

1. **MATTE SURFACE SCREEN.** Matte surface screens reflect incident light in such a way that their brightnesses are substantially the same at all angles of view — hence they are recommended where the viewers occupy a wide angle. A surface coated with a flat white paint has this characteristic. Several screen materials are available which produce a similar result (Fig. 1 curve). This type is required in practically all theatres because of the wide viewing angles and is recommended for other auditoria for the same reason.

2. **BEADED SCREEN.** The surface of a beaded screen is covered with small glass spheres which reflect the major part of the light back in the direction from which it came (Fig. 1 curve).

To observers sitting near the axis of projection, pictures on beaded screens are several times brighter than pictures on a perfectly reflecting matte screen. To observers about 22 degrees off the axis of projection, pictures seen on both types would appear equally bright, except that the far side of the beaded screen would appear somewhat brighter than the near side. This brightness difference

This compendium of data anent the characteristics of the four general classes of motion picture screens should prove to be a valuable aid in insuring proper presentations in all situations. These data have been approved by all recognized authoritative bodies including the SMPE, American Standards Assoc., and the Illuminating Engineering Society.

is greatest at the shorter viewing distances.

Such screens rarely are used now for theatre projection because they do not

however, such screens are used to obtain higher picture brightnesses when viewing positions can be kept within about 22 degrees of the projection axis. It is

TABLE A. Lumens-at-Screen for Non-Theatrical Projection

SCREEN SIZE (feet)	MATTE SCREENS		BEADED SCREENS
	Lumens for 5 Footlamberts	Lumens for 20 Footlamberts	Lumens for 5-20 Footlamberts
2.5 x 3.33	55	210	45
3 x 4	75	305	65
3.75 x 5	120	475	105
4.5 x 6	170	690	150
5.25 x 7	235	940	205
6 x 8	305	1,225	265
6.75 x 9	385	1,540	340
7.5 x 10	480	1,915	415
9 x 12	690	2,750	600
10.5 x 14	935	3,745	815
12 x 16	1,230	4,920	1,070

satisfy the brightness requirements of the entire normal seating area, particularly where the projection room is well above the audience level. Where the axis of projection is only slightly above eye level,

particularly important to observe the minimum viewing distance recommendations given elsewhere herein.

3. **METALIZED SCREEN.** The surface of metalized screens is coated with fine particles of metal, usually aluminum, each of which reflect light specularly (Fig. 1 curves). Such screens show a pronounced "hot spot" which is near the center of the screen for those near the axis of projection. The hot spot moves toward the near side of the screen as the observer moves away from the axis.

Brightness differences increase with viewing angle and with reduction in viewing distance and are excessive for theatre projection. Metallic screens are necessary, however, for viewing polarized projected pictures.

4. **TRANSLUCENT SCREEN.** As its name implies, the characteristic of the translucent screen is to transmit light. The material used must be sufficiently thin so that there is a minimum loss of definition in the projected image and yet sufficiently diffusing to satisfy the requirements of brightness uniformity through the desired angle.

When completely diffusing, their properties are essentially the same as those of the matte screen, but the brightness is less for a given amount of incident light. Translucent screens of high trans-

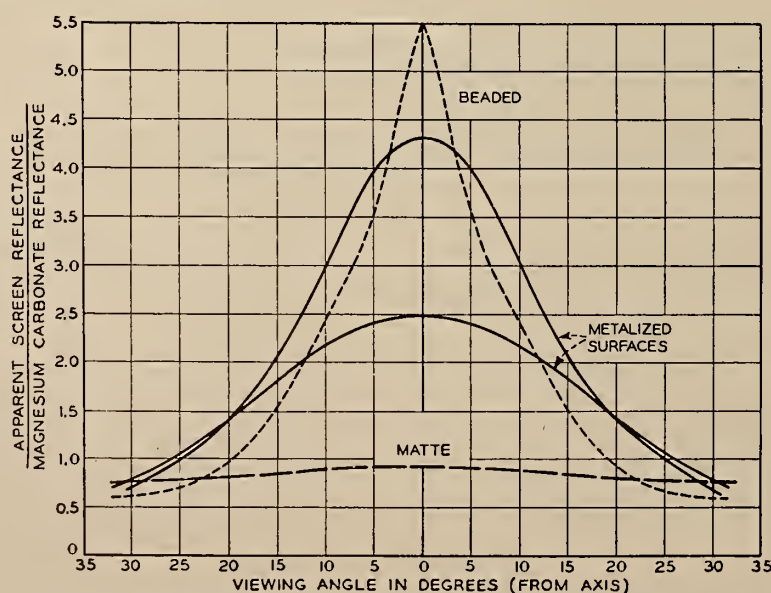


FIGURE 1. Reflectance characteristics of screen surfaces. The reflectance values shown are expressed as a per cent of the reflectance of a magnesium carbonate block. The reflectance of a fresh clean magnesium carbonate surface is approximately 98 per cent.

mittance approximate the characteristics of metalized screens: a "hot spot" becomes increasingly apparent as the transmittance is increased.

Since such screens are primarily transmitters rather than reflectors of light, they have the important advantage of being effective under higher levels of illumination than could be tolerated for a reflecting screen. A large portion of any stray light falling on the front of the screen passes through and thus causes less loss of contrast in the projected picture. On the other hand, extraneous light behind the screen is detrimental.

Maximum, Minimum Viewing Distance

At a viewing distance greater than 6 times the width of the screen, picture details are not satisfactorily resolved. Picture widths should equal approximately one-sixth of the distance from screen to the farthest row of seats (Fig. 2).

If the observer is sitting too close to the screen, nervous strain and physical fatigue result from imperfections in the projected image and excessive eye movement in attempting to scan the entire screen area. In addition, when beaded screens are used, viewing from too short a distance increases the non-uniformity of screen brightness because of the large angle subtended by the scene.

For restricted areas (classrooms, industrial showings) seats should not be

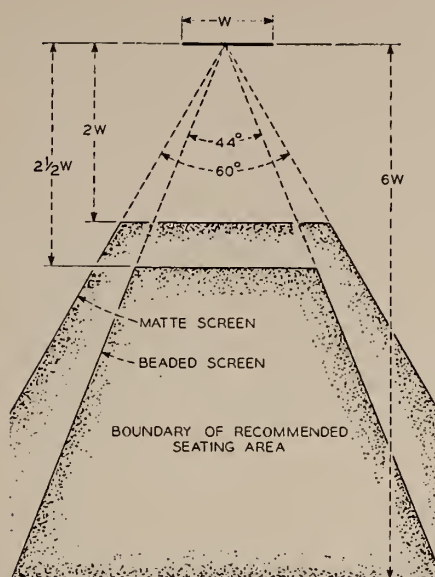


FIG. 2. Recommended seating area for comfortable viewing and acceptable brightness and uniformity for various types of screens.

closer to the screen than twice the picture width in any case, and when beaded screens are used a slightly greater minimum viewing distance ($2\frac{1}{4}$ to $2\frac{1}{2}$ times picture width) is better. The Society of Motion Picture Engineers recommends that, in motion picture theatres, the front row of seats should not be closer to the screen than 0.87 times the picture width.

To avoid objectionable distortion of

the projected picture, viewing angles should be limited to 30 degrees from the normal to the screen. This condition is fulfilled approximately when no row of symmetrically set seats is longer than its distance from the screen (Fig. 2).

The ratio of height to width for theatre screens corresponding to the proportions of 35-mm film should be picture film the same ratio of picture height to picture width applies; but for educational and industrial film a square of screen usually is preferable since it may be used also for the projection of slides, in which the greater dimension may be either horizontal or vertical.

Required Light Output of Projectors

In order to determine the required light output of a projector, it is necessary to know the picture size that satisfies the viewing conditions and the average reflectance at the applicable viewing angles of the screen to be used. With this information, the lumens required to meet the brightness recommendations can be calculated by the formula shown in Table D.

NON-THEATRICAL PROJECTION. Lumens-at-screen values to satisfy the recommended brightness values for educational and industrial projection for several screen sizes are given in Table A. Only one set of values is given for beaded screens because the brightness differences

TABLE B. Screen Illumination Provided by Typical Carbon-Arc, Motion Picture Projection Systems

CARBON				ARC		LAMP OPTICAL SYSTEM	SCREEN LU- MENS‡	FOOTLAMBERTS AT SCREEN CENTER§					SCREEN LU- MENS‡	BRIGHTNESS RATIO	FOOTLAMBERTS AT SCREEN CENTER¶				
Positive		Negative		Amp	Volts			10 feet	15 feet	20 feet	25 feet	30 feet			10 feet	15 feet	20 feet	25 feet	30 feet
Diameter (milli- meters)	Length (inches)	Diameter (milli- meters)	Length (inches)																
12	8	8	8	32	55	10 in. diam <i>f</i> /2.3 Mirror*						2,500** 3,400††	70 70	15.6 21.1	7.0 9.4				
7	12 or 14	6	9	40	27.5	11½ in. diam <i>f</i> /2.5 Mirror*	4,600** 5,900††	11.9 15.3	6.6 8.6			5,000** 6,500††	65 65		14.7 19.2	8.3 10.8			
7	12 or 14	6	9	42	33	14 in. diam <i>f</i> /2.3 Mirror*	4,900** 6,600††	12.8 17.1	7.2 9.6			5,500** 7,500††	60 60		16.0 21.8	9.0 12.2	7.8		
7	12 or 14	6	9	50	37	14 in. diam <i>f</i> /2.3 Mirror*	6,400** 8,600††	17.0 22.4	9.5 12.6	8.0		7,200** 10,000††	60 60		21.5	12.0 16.6	7.7 10.6		
8	12 or 14	7	9	60	36	14 in. diam <i>f</i> /2.3 Mirror*	7,600** 10,300††	20.2	11.4 15.2	7.3 9.7		8,200** 11,000††	65 65			13.4 18.2	8.5 11.6	8.1	
8	12 or 14	7	9	70	40	14 in. diam <i>f</i> /2.3 Mirror*	9,600** 13,000††		14.4 18.8	9.2 12.0	8.3	10,600** 14,000††	65 65			17.7	11.3 14.3	7.9 10.0	
13.6	22	7/16 in.	9	125	68	Condenser Lenses at <i>f</i> /2.0*	7,500** 11,500††	19.6	11.0 16.6	7.0 10.6	7.4	9,200** 14,500††	65 60			14.8	9.5 15.3	10.6	
13.6	22	½ in.	9	150	78	Condenser Lenses at <i>f</i> /2.0*	11,000** 16,000††		16.5	10.6 14.8	7.4 10.3	13,000** 19,500††	60 60			14.0	9.7 14.6		
13.6	22	½ in.	9	170	75	Condenser Lenses at <i>f</i> /2.0*	11,000** 18,500††		16.5	10.6 16.6	7.4 11.5	13,000** 21,500††	65 60			13.5	9.3 16.4		
6	8½	5.5	6	30	28	10½ in. diam <i>f</i> /1.6 Mirror†						2,300††	70	14.4	6.4				

* 35-millimeter film projection system, 0.600 x 0.825 inch aperture.

† 16-millimeter film projection system, 0.284 x 0.380 inch aperture.

‡ Screen lumen figure is for systems with no shutter, film, or filters of any kind.

§ Footlambert figure at center of screen assumes 50 per cent shutter transmittance, a perfectly diffusing screen with 75 per cent reflectance and no film or filters of any sort; system adjusted so brightness at side of screen equals 80 per cent that at center. Screen width in feet is listed.

|| Brightness ratio refers to ratio of brightness at side of screen to that at the center.

¶ Value with system adjusted to produce maximum brightness at the center of the screen.

** 5.5-inch effective focal length f/2.5 uncoated lens.

†† 5-inch effective focal length f/2.0 coated lens.

‡‡ 2-inch effective focal length f/1.6 uncoated lens.

TABLE C. Picture Sizes Obtained With Various Lenses, Projection Distances

$$\text{Lumens} = \frac{\text{desired brightness (footlamberts)} \times \text{area of screen (square feet)}}{\text{Average reflectance (a decimal)}}$$

encountered over the range of viewing positions embrace the recommended brightness range.

THEATRE PROJECTION. In order to ensure a sufficient screen brightness for proper viewing conditions, American Standard Z-22.39-1944 specifies: "The brightness in the center of a screen for viewing 35-mm motion pictures shall be $10 \pm \frac{1}{2}$ foot-lamberts when the projector is running with no film in the gate." A projector light source of very high brightness must of necessity be employed in order to ensure conformance with this standard. In addition, the light source must be of a color quality permitting the faithful rendition of colored film.

For these reasons carbon arcs are used almost universally in the projection of 35-mm motion pictures. Carbon arcs range in brightness up to 100,000 candles per square centimeter. They may be made to produce light having a color approximately represented by an equal energy spectrum. This is adapted to the projection of color transparencies.

Table B gives data on various screen and projector combinations.

In all except opaque picture projectors the lenses or reflectors used to illuminate the picture aperture are designed so that an image of the light source is formed in or near either the projection lens or the picture aperture. If the luminous portion of the source is imaged in either the projection lens or the picture aperture, it is desirable to have the image size fill that element.

If it is smaller, either the full light-collecting ability of the system is not being utilized, or the entire picture area is not illuminated. If it is larger, all of the available light is not being utilized and the excess wattage results in unnecessary heat. The same general relationships exist when the source is imaged near either the projection lens or the aperture. For each projector design there is an optimum source size.

There is no harm in using source sizes smaller than that required to fill the projection lens in those cases where the source is imaged in or near the projection lens if the amount of light obtained is sufficient for the projection conditions. In fact, the use of such smaller sources is desirable in such cases because of the economy of the reduced wattage. The important point to remember is that there is no advantage in using sources that are too large for the projection system because they do not provide any

significant increase in illumination.

There are several methods for determining the utilizable source size:

1. If a source of diffuse illumination is provided directly in front of the projection lens, light will pass back through the optical system and form a spot at the source position. The size and shape of this spot defines the utilizable area.

2. The source ordinarily used in a projector can be used in its proper position and the correctness of its size can be determined by looking back into the projection lens. An aerial image of the

source will be seen in the lens. It should fill the picture aperture completely. When using this method it is necessary either to dim the source or to view it through some transparent light-absorbing medium.

3. A variation of the second method is to use a supplementary lens to project on a convenient screen an image of the source. Its size in relation to its associated aperture can thus be observed.

If the projection system is of a design such that the source is imaged at the picture aperture, the source or that part which lies within the aperture must have a high order of brightness uniformity so the screen is evenly illuminated.

Table C shows the size of projected pictures that result from several combinations of projection lens focal lengths and projection distances.

TABLE D. Lumens Required to Meet Screen Brightness Recommendations

LENS-TO-SCREEN DISTANCE (feet) ...		5	10	15	20	25	30	35	40	50	70	80	100	150
Focal Length of Lens (inches)	Type of Projector	SIZE OF PICTURE												
		ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.	ft in.
1	8 mm	W 2 0 3 9 5 8												
		H 1 6 2 9 4 3												
1	8 mm	W 1 0 1 10 2 10 3 9 4 8 5 8												
		H 9 1 5 2 2 2 10 3 6 4 3												
1	16 mm	W 1 10 3 9 5 8 7 6 9 4 11 6 13 4 15 0												
		H 1 4 2 10 4 2 5 6 6 11 8 7 9 11 11 2												
2	16 mm	W 1 0 1 10 2 10 3 10 4 8 5 8 6 6 7 6 9 4												
		H 9 1 4 2 10 2 10 3 6 4 3 4 10 5 7 6 11												
2	35 mm	W 1 10 3 9 5 8 7 6 9 4 11 6 13 4 15 0												
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3	16 mm	W 1 1 3 1 10 2 6 3 2 3 8 4 4 5 0 6 4												
		H 11 1 4 1 10 2 4 2 9 3 3 3 9 4 8												
3	35 mm	W 1 5 6 9 8 2 9 6 10 9 13 6 19 12 1 9 27 4												
		H 3 9 4 9 5 9 6 9 7 9 9 9 13 9 15 8 19 8												
3	Miniature Slide	W 4 8 7 0 9 4 11 7 14 0												
		H 3 0 4 7 5 11 7 6 9 1												
3 1/2	35 mm	W 4 8 7 0 9 4 11 7 14 0												
		H 3 0 4 7 5 11 7 6 9 1												
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4	35 mm	W 4 1 5 1 6 2 7 1 8 2 10 3 14 3 16 4 20 6												
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4	Miniature Slide	W 3 7 5 4 7 1 8 9 10 7												
		H 2 2 3 5 4 4 5 9 6 10												
4	Slide	W 9 1 13 9 18 5 23 12 7 9												
		H 7 3 11 0 14 9 18 6 22 3												
6	35 mm	W 4 1 4 6 5 4 6 9 9 0 10 9 13 6												
		H 2 9 3 4 3 9 4 9 6 9 7 9 9 9												
6	Miniature slide	W 2 4 3 6 4 7 5 10 7 1												
		H 1 5 2 2 3 0 3 9 4 4												
6	Slide	W 5 11 9 1 12 2 15 3 18 5												
		H 4 9 7 3 9 9 12 3 14 9												
8	35 mm	W 4 1 5 2 7 1 8 2 10 2												
		H 2 9 3 8 5 2 5 9 7 4												
8	Miniature	W 1 10 2 8 3 7 4 6 5 3												
		H 1 1 1 9 2 2 2 11 3 5												
8	Slide	W 4 4 6 8 9 1 11 5 13 9												
		H 3 6 5 5 7 3 9 2 11 0												
10	Slide	W 3 5 5 4 8 0 9 1 10 11												
		H 2 9 4 3 5 9 7 3 8 9												
20	Slide	W 1 6 2 6 3 5 4 4 5 4												
		H 1 3 2 0 2 9 3 6 4 3												

Color, Video, Feature 63 SMPE Meet

WITH a record number of 71 technical papers listed, a majority of which will be accompanied by demonstrations, sound films, slides and other audio-visual aids, the 63rd convention of the Society of Motion Picture Engineers was opened on May 17 at the Ambassador Hotel, Santa Monica, Calif. On the second day of the five-day meeting more than 1000 registrations had been recorded.

The nine technical sessions originally planned for the meeting were expanded to 11 to accommodate the wealth of papers ranging from a new type of acetate film through magnetic recording and advanced television technique to a full-dress color symposium, the latter being a joint session with the Inter-Society Color Council. Previous West Coast meetings of the Society have been more or less insular affairs by reason of the reluctance of Eastern members to make the long trek to the Pacific, but this 63rd session will tax the ingenuity of Bill Kunzmann, perennial Society convention director.

Technique, Color Film Advantages

The motion picture industry's preoccupation with the upsurging television industry is underscored by Society President Loren Ryder's statement that technical excellence and color are the greatest technical advantages that the film industry now has over the video art. This belief prompted the scheduling of four complete sessions on color and three programs on television and its application to both film studios and theatres.

Organized in 1916, the Society enters its 33rd year with more than 2500 members representing every conceivable phase of motion picture production, distribution and exhibition, together with many members from organizations in the allied arts and sciences. One of the most important Society activities is its work as official representative for motion picture standards on the American Standards Association roster.

Papers abstracts available at press time are appended hereto:

AN IMPROVED SAFETY MOTION PICTURE FILM SUPPORT

By Charles R. Fordyce
Eastman Kodak Company

Extensive experimental work on Safety cine film support has resulted in an improved product which offers possibilities for professional motion picture use. This product is a highly acetylated cellulose acetate with physical properties which are considerably different from those of ordinary commercial cellulose acetate previously used. Certain improved physical characteristics and im-

proved aging properties of this base material are described in detail.

As a cine positive film support the high acetyl cellulose acetate is shown to give satisfactory behavior in printing, processing, and projection operations, and compares favorably with present standard release positive film.

Experimental studies on the use of the high acetyl base for 35-mm negative film are described showing that this base will lend itself to use for negative materials. Particularly important is the fact that this base offers a very low degree of shrinkage on long-time keeping.

INDUSTRIAL SAPPHIRE IN FILM EQUIPMENT

By Walter Bach & Chris Wagner
Berndt-Bach, Inc. & Elgin National Watch Co.

This paper directs attention to an engineering material which has the most favorable coefficient of friction in relation to film emulsions and bases among known commercial products. Characteristics of sapphire in fine watches, the development of industrial sapphire and potential motion picture equipment applications are discussed briefly. A description of the Auricon camera film gate with regard to the use of hard contact points and the mounting of sapphire contact surfaces were illustrated with slides.

Physical characteristics of sapphire were discussed, accompanied by slides of charts and performance data. Brief mention was made of diamond lapping compounds and the metal bonding and flame forming of sapphire.

COLOR PHENOMENA

By Isay Balinkin
University of Cincinnati

The use of the term "phenomena" in color implies that color is not a thing-in-itself but that it is a perceptual aspect of appearance

I. A. ELECTIONS

LOCAL 164, MILWAUKEE, WIS.

Glenn C. Kalkhoff, *pres.*; Otto A. Trampe, *bus. mgr.*; Walter Behr, *vice-pres.*; Robert Lucht, *rec.-sec.*; George Wittmann, *treas.*; George Brader, Norman Haberstat, Charles Beggs, John Black, *exec. board*; Glenn C. Kalkhoff, Otto A. Trampe, *del. to Wisconsin State Fed. of Labor*; Otto Trampe, Glenn C. Kalkhoff, Walter Behr, *del. to IA Convention*.

LOCAL 433, ROCK ISLAND, ILL.

Kenneth Horton, *pres.*; Edward Short, *vice-pres.*; Fred Parker, *bus. rep. and rec.-sec.*; Warren Castle, *fin.-sec.*; Lloyd Burrs, *treas.*; Mark M. Maston, *layman of board*.

LOCAL 792, PLYMOUTH, MASS.

Wendell F. Bassett, *pres.*; J. Lester Harrison, *vice-pres.*; John Wm. Reed, *sec.-treas.*; Wm. D. Swan, Jr., *bus. agent*.

determined by the physical nature of the light source, chemical characteristics of the interacting substance, and the psychological response of the observer. In order to make three aspects of color clear, more than 20 experiments and demonstrations accompanied the paper. The governing consideration in making the selection of necessary equipment was that it be basically simple, stimulating and, in some cases, entertaining. Dynamically-operated, mechanical models are used to explain color phenomena which are not directly susceptible to our senses.

A partial list of short titles of the demonstrations includes: Liquid light—the light of a firefly. The physicist's rainbow. In sodium light all colors are of the same hue. Colored wave-lengths. All colors "turn" into white. Why is everybody prematurely gray? A color match is what light makes it. "Whiter" than white. It is red but it looks blue-green. Liquid color magic. Color transmission of human flesh. There is no "bounce" in black. The shadow is light.

SEEING LIGHT AND COLOR

By Ralph M. Evans
Eastman Kodak Company

The process of seeing is somewhat different from commonly accepted notions. Three sciences are involved in the understanding of its principles and characteristics.

All vision of the external world requires light. Light is a physical phenomenon and the principles of its action are described by the science of physics. This light enters the eye of an individual and affects the nerve endings on his retina. From these an electrical current is produced which travels back to his brain. This part of the subject properly falls in the science of physiology.

Certain effects produced in the brain follow well-defined laws and are quite predictable in nature. These effects are enhanced by the science of psychophysics.

After a brief discussion illustrating the part played in vision by these differing types of action, this paper is devoted to a carefully illustrated discussion of the way in which the mind interprets the information so received. A distinction is made between form and color vision, and it is shown that for the most part what we see depends as much on ourselves and our experiences as on the external reality which the light presents to our eyes.

The discussion then turns to the seeing of color and in particular to the seeing of colored objects. By a rather complete series of pictures it is shown that seeing is largely a matter of recognition of objects with properties believed to be possessed by those objects. From this it is shown that the mind has the ability to see several things simultaneously at the same spot. It follows that it is not entirely the physical or physiological facts which determine what we see but also to a great extent our knowledge of external reality as supplied by the mind.

As the best example of this it is shown how it is possible for a person to see objects

(Continued on page 32)

THE articles on the composition, handling and storage of nitrocellulose film, by R. A. Mitchell, which have appeared in recent issues of IP^{1,2} has done much to reawaken craft interest generally in this most important aspect of motion picture projection. Particular interest has been exhibited in two factors discussed by Mr. Mitchell, as follows:

1. The efficacy of carbon-tetrachloride fire extinguishers when used on burning nitrate film, and
2. The proper method of storing both nitrate and acetate film for varying periods of time.

Further data bearing on these two points is presented here for the benefit of the many readers of IP who have expressed interest therein.

Relative to carbon-tet extinguishers, Mr. Mitchell expressed the opinion that while ordinary fires may be extinguished by blanketing the blaze with an oxygen-excluding gas such as carbon-tet vapor, this does not hold true for burning film. *Film contains its own oxygen*, points out Mr. Mitchell, and a carbon-tet extinguisher may or may not put out a film fire, depending upon the intensity of the blaze.

Intensity of Heat Governs

A really hot fire will immediately convert the carbon-tet to gas, thus robbing it of any cooling effect it may have. In addition, there are vitally important physiological aspects contingent upon the circumstances surrounding the use of such extinguishers.

Carbon-tet in the commercial form used in fire extinguishers is a liquid which, in the opinion of health authorities, produces fumes by evaporation which are injurious to human health. Impurities in the substance add to the bad effect on human beings.

Carbon-tet vapor in a room or other confined space will produce results depending upon the amount of vapor in the room, the degree of ventilation provided, the nearness of the individual to the source of the vapor, the physical condition of the person breathing the fumes, and other factors. Accordingly, it is impossible to give a general rule as to exactly what will occur when a person breathes these fumes.

It seems certain, however (and this opinion has the warrant of many eminent health authorities) that under many conditions the health of a person will be far from being improved as a result of inhaling carbon-tet fumes.

The fumes of carbon-tet have definitely been proven to be injurious when inhaled (more poisonous than chloroform) and, what is worse, they react with the inevitably present water vapor of the air in

Handling, Storing Cine Film

A summary of practical data applicable to both nitrate and acetate stock, whether of 35- or 16-mm gauge, together with supplementary notes anent carbon-tetrachloride and other common types of fire extinguishers.

contact with hot iron or iron oxides to form phosgene. Phosgene is one of the favorite poison gases used in warfare and is therefore not a good friend to people in its vicinity!

Immediate Room Exit Urged

Quite apart from the worth of various fire extinguishers, however, it is highly questionable whether anyone in his right mind would willingly stay in a projection room in which nitrate film was burning fiercely, generating clouds of nitrous oxide gas capable of forming nitric acid in the lungs, and at the same time spray carbon-tet on the flames so as to add the fumes of that liquid to those in the room, with the possible addition of a bit of phosgene.

It must be admitted that some rather reassuring statements have been made concerning the whole matter. However, even assuming that there is fine ventilation in the projection room, that a small

amount of film is burning, that but little carbon-tet is sprayed upon it, and that the projectionist who does the spraying is at a good distance from the flames—the whole process seems like a very risky and undesirable business.

Being in a room full of gases generated by burning film and by the evaporation of carbon-tet and perhaps even worse products may be safe. However it is too much like the story of the man who assured a stranger that a certain very fierce-looking dog would not bite. The stranger replied:

"You know the dog won't bite. I know know the dog won't bite. *But* does the dog know he won't bite?"

Anent film storage, comparatively few projectionists have any direct interest in this topic since given reels of film are seldom in their possession for more than a few days at a time. However, the appended data on the storage problem should be of general interest to all projectionists.

Procedure at National Archives

Following is a discussion which ensued incident to the presentation before the SMPE of a paper on film storage by Captain A. B. Bradley, for many years in charge of all film at the National Archives and now engaged in similar work at the Library of Congress. In the appended discussion it will be understood that the answers are given by Captain Bradley.

Q. Do you treat film chemically before it is stored, or do you just put it away as is?

A. Attempts are being made to treat the film in the laboratory to bring the salts up to a state of solubility, and therefore enable the maximum amount of hypo to be removed; and after that it will be a question of house-keeping in terms of temperature and humidity.

But relative to coating and impregnation, embalming, and other techniques to put on

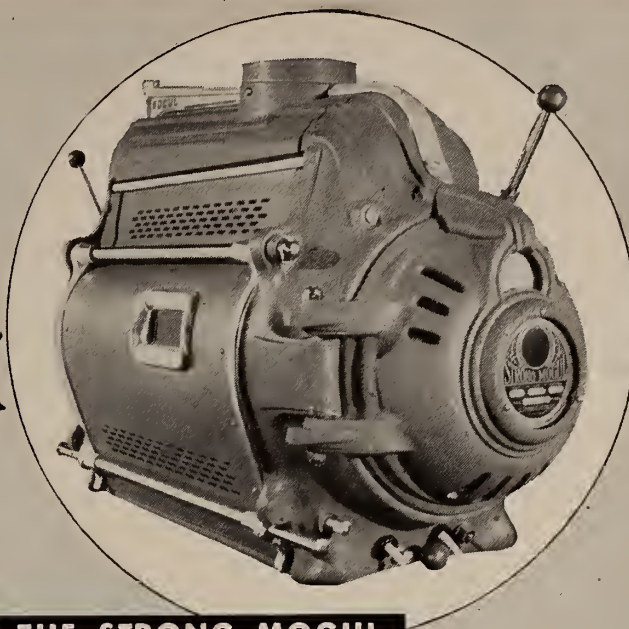
Positive developing machine at 20th-Fox lab in Hollywood. Note film being fed into the tank directly from printer. First tank contains developer and first wash, next the hypo and second wash. Thence to air-conditioned drying chamber which excludes any unwashed air. From the dryer film goes directly to process machine and is then ready for delivery to exchange.



¹ "The Anatomy of Nitrocellulose Film: Its Import to the Projectionist," IP for February 1948, p. 5.

² "Projection Room Handling of Prints," IP for March 1948, p. 5.

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**THE NEW STRONG SINGLE PHASE
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NAME

THEATRE

STREET

CITY AND STATE

the outside of the film, these have been tested by the Bureau of Standards. Chemically we have found that none of these things add to the life of the film. As to mechanics and to wear and tear on the film, that is another matter.

Q. What percentage of the films have you had to duplicate because of incipient and partial decomposition?

A. A considerable body of film has deteriorated because we were not able to duplicate because of lack of funds, equipment and personnel. In many cases, when the film was brought out of storage, unwrapped and unwound, the moisture in the air immediately precipitated deterioration; overnight, almost.

Advocates Equalization of Temperature

We have developed tempering techniques, bringing the film out and letting the temperature rise slowly by radiation. Care should be taken to prevent exposure of the film to the air until the temperature of the film is in balance with the temperature of the air; otherwise condensation on the surface of the film will result.

Q. To what extent do you plan to store the film at low temperatures—say, around 50 F.—and to what extent do you plan to isolate the films in individual compartments as against mass storage in a unit vault?

A. Nitrate film of high record value we intend to store in cabinets, reducing the unit of risk to a minimum, perhaps one reel instead of a vault full of reels. We intend, for the same film of high record value, to maintain temperatures of about 50 F. and about 50% relative humidity. That is about as low a temperature as people can work in.

We will have the tempering cans in which we will bring the film out of the vaults, set them in the workroom, and let radiation lift the temperature so it will be safe to unwind the film. Film of less record value can be stored without the cabinets. However, our entire program contemplates the transfer of record film to acetate stock as fast as funds will permit, so all record film will ultimately be on safety stock, which has a much longer life than nitrate film.

Estimated Film Life in Storage

Q. Has any estimate been made as to the life of the film in storage?

A. Three to five hundred years for acetate film, at which time it can be copied and perpetuated for perhaps three to five thousand years.

Q. Has any progress been made in the transfer of images to metal films?

A. It does not seem necessary. The only metal used above an experimental stage has been aluminum which will pit under the influence of sulphur fumes. It also is faulty in that it crinkles and has to be ironed out. It is also opaque and projection has to be by reflection; but so far no other metal has been used widely. When acetate film has preservation characteristics better than the best rag paper, we do not feel the need for metal.

Q. Anent the vaults in The Archives Building, are the cabinets of 18-8 stainless steel, and have you observed any corrosion of the metal? Will it be necessary to construct them of molybdenum stainless steel instead of ordinary 18-8?

A. The cabinets are of molybdenum stainless steel. There has been some corrosion on them owing to the fluxing material when they were welded and fabricated. However, that is a seepage process which we believe will expend itself in a few years. We are simply wiping it off with lemon oil and watching it, but the main body of the cabinets themselves seem to be holding up nicely.

A new cabinet has been developed, called the Cascade Cabinet, which can be made out of ordinary furniture steel at considerably less cost, can be thrown away when it rusts over a period of time, and be much cheaper than stainless steel. The latter cabinets cost us about \$30 per reel to put the film away. Cabinets for eight vaults (about 2000 rolls) cost us about \$60,000, which is much above the reach of the average film library.

The Cascade Cabinet can be built for about \$2 per roll (wholesale cost), and by painting and by having proper air we feel that they will not rust for over a decade at least; and at that time, if they did rust, new cabinets could be put in. They avoid insulation and other excessive expenses.

Handling, Preserving 16-mm Film

The handling and preservation of 16-mm acetate (safety) film introduces problems not encountered with 35-mm nitrate stock. To those who inquired about correct procedure for 16-mm stock, R. A. Mitchell, author of the original contributions on film handling, offers the following:

Many modes of treatment effective for 35-mm nitrate film do not work well with acetate stock. Neither the late F. H. Richardson in his *Bluebook* nor I in my articles on the projection room handling of prints had 16-mm film in mind. 16-mm film is constituted differently chemically from 35-mm nitrate stock in that no camphor or similar substance is used in the manufacture of the

former, it all being acetate ("safety") film. Thus it appears doubtful that camphor could be used with any success for the purpose of lengthening the life of 16-mm prints.

Safety film base has a much greater capacity for moisture than nitrate base. When much of the absorbed moisture is lost by repeated projection or by exposure to excessively dry air, the film becomes brittle and in this state is easily torn or broken. In the case of 16-mm film, therefore, "humidifying" by some means whereby the film is exposed to a humid, or moisture-containing atmosphere is distinctly beneficial, although even this treatment won't prolong film life indefinitely.

It is safe to say that 16-mm films will last longer if stored under proper humidifying conditions, but of course no one can say how much longer. Prints suffer greatly from ordinary use. Projection of 16-mm film by high-powered lamps greatly shortens their useful life.

Water Tanks in Film Cabinets?

What about water tanks in the film cabinets? Don't use them, Richardson notwithstanding. The risk of film damage is too great. Much better are the humidor-type film cans that have been on the market for many years. These cans are provided with blotting paper or other absorbent material in the covers. The blotting paper may be moistened with plain water or with a dilute solution of glycerine—the same kind sold at drug stores as a hand lotion. Glycerine has the property of holding moisture for a long time, and this retards the drying out of the blotting paper in the humidor film can. (Similar humidors are used for keeping pipe tobacco moist at all times.)

If the films are not kept in individual cans, perhaps some arrangement may be devised for moistened blotting paper or absorbent cotton inside the storage cabinets used. Just be sure that there is no possibility of the film getting wet. I think some good will result from such an arrangement, even though reels are shipped out during the day.

When films are stored for long periods of time—say, several weeks or months—great care must be used to prevent too much humidity. If the film "dews," that is, if tiny droplets of water condense upon it from the air, great damage may ensue. No matter what the film base is made of, dampness has a softening effect on the emulsion. We all know how easily emulsion scrapes off after having been dampened.

I once purchased several reels of theatre film which had been stored in the vaults of a big film laboratory for more than ten years. The air in this vault—a large room in which the open reels are stacked on racks like books in a bookcase—was kept moist continually by tanks of water arranged in the old-fashioned "approved" manner.

Although old, these prints had never been projected and therefore could be said to be "brand-new." But they had been so saturated with moisture that the emulsion had softened and the layers of film were literally glued together. Some kind of mildew which imparted a peculiar "peppery" odor to the film had attacked the emulsion along the edges. It required many hours of hard

(Continue on page 30)

Consolidate RCA Film Section, With Kreuzer Heading Group

Consolidation of all RCA motion picture activities into a newly-created RCA Theatre and Recording Equipment Section has been announced. Comprising the Section will be the following groups:

Theatre equipment, Film Recording, and Brenkert Light Projection Co. General manager of the combined groups will be Barton Kreuzer, who, joining RCA in 1928, has served successfully in the development, engineering, installation, service, and for the past two

years as head of film recording activities.

J. F. (Jack O'Brien) will continue to direct sales of all theatre equipment, and Karl Brenkert still will oversee activities at the projector manufacturing plant in Detroit.



Barton Kreuzer

Theatre Television: A General Analysis[†]

THERE will be discussed briefly the advantages and limitations of five possible locations of tele projection equipment in a theater. Assuming available space and facilities, the projection room itself seems at first to be the desired location, provided again that efficient tele projection systems can be built for the corresponding throw. If film recording is used, the projection problem presents few difficulties.

(A) A first possible location for such equipment is behind the translucent screen, with the picture projected on the screen toward the audience. One advantage of this system is that no space is required in any part of the theater other than back stage, nor need any structural modifications be made anywhere else in the theater (except as required for wiring). If the projector were mounted at a height equal to that of the center of the screen, keystoneing would also be absent.

There are, however, certain limitations to this location. For one thing, the necessary space for the required throw simply may not be available backstage. It is unlikely that complete flexibility of design and placement will exist in present-day theaters. Further, projection of this type will require, in most instances, a very wide-angle projection lens which will have a correspondingly low aperture or light-passing value.

High Cost, Low Efficiency

The cost of the elevated support for the projector (assuming no keystoneing) and the cost of the surrounding projection room, may be considerable. The efficiency of a translucent screen, even of a highly directional type, is generally considerably below that of an opaque screen.

The out-of-the-way location of the tele projector necessarily would require a duplicate operating staff, except in the unlikely event that the entire equipment could be accurately and simply controlled remotely from the projection room. Such remote control, however, doubtless would be costly and less than simple.

(B) A second possible location for the equipment is either on or below the stage, or in the orchestra pit. In this case an opaque screen would be used with front projection.

The advantages of such a plan include the absence of need for any modifications either in the orchestra, balcony, or projection room. Further, no seats need be removed. However, a rather special type of directional screen would be required

By DR. A. N. GOLDSMITH

II. In this installment of a series of three articles is discussed five possible locations of theatre tele equipment, sound reproduction methods, and some color-tele methods and problems.

for such a markedly oblique projection position.

Among the difficulties to be expected in this case may be mentioned the following: Space may not be available either below stage or in the orchestra pit. Rather extensive structural changes might be required. The projectors necessarily would employ wide-angle optical systems because of their nearness to the screen, and such equipment usually is inefficient producing bright pictures. Serious keystoneing might be anticipated, requiring correction. Again a duplicate operating staff, or, alternatively, remote control of the projection equipment, would be needed.

Central Axis of Orchestra

(C) A third possible location for the television-projection equipment is somewhere in the central axis of the orchestra.

Such a location has the advantages of offering considerable flexibility in the selection of the precise place at which the tele projector is installed. Thus, this system is extremely well adapted to provide whatever throw is optically preferred and economically desirable. Further, no space in the projection room is needed nor yet any changes in the room equipment (beyond control and interconnection circuits for signaling, and the like). In addition to providing an adequate and selected throw, this location permits the

ready use of a suitably directional opaque screen.

There are some limitations in such a system. Certain seats in the orchestra must be removed to make way for the projection equipment. Persons located behind the projector may experience difficulty in viewing the tele picture pleasantly. The intrusion of operated equipment in the orchestra to some extent interferes with the desired theatrical "illusion of reality".

The costs of wiring and certain related costs may be considerable for such a location, since most theaters have been designed without any consideration of such a possible future need. There will be some keystoneing from projection at orchestra level requiring correction. Since the projector light beam emanates from a point in the orchestra it may be visible, particularly where smoking is permitted or dusty conditions prevail. This system will also require two operating staffs, one for motion pictures in the projection room and one for tele in the orchestra location, again assuming that remote control of tele projectors is not feasible on an everyday basis.

Balcony Site Advantageous

(D) A fourth conceivable location is somewhere between the extreme front and extreme back of the first or second balcony.

Such a system has certain advantages. It permits considerable flexibility in locating the equipment. It requires no added space or change in the projection room, excepting perhaps of minor nature. Important orchestral seats are left without any change or intrusion. As before, any desired type of opaque directional screen may be used.

Among the anticipated difficulties for such a location are the following: Certain of the balcony seats must be removed and the view from certain other

•
Typical tele studio set-up for dramatic show. Note multiplicity of cameras, numerous operating personnel, banks of overhead lights, and mikes for audio pickup.
•



[†] J. Soc. Mot. Pict. Eng. for February 1948, p. 95.

seats will be blocked (unless the tele projectors are placed at the extreme back of one of the balconies). Undoubtedly strengthening of the balcony structure will be required in some instances; this may prove a costly and cumbersome undertaking. The added expense of special wiring and certain related costs will be involved for balcony locations.

The picture throw will in general be a long one, and this may not fit in with the best designs for current tele projectors of the direct type. As in all other balcony locations, keystone correction will be needed. Assuming personal operation of the tele projectors, two operating staffs will be needed or their equivalent, with proper co-ordination and intercommunication.

Present Projection Room

(E) A fifth and final possible location is in the projection room itself.

Such a location offers certain obvious and attractive advantages. For one thing, it concentrates all projection equipment, of whatever nature, in one room. Similarly, all wiring and interconnection is in the same room. Only a single operating staff is needed, although this staff may be a larger one ultimately than would be required for film projection alone.

It is also simple to use film-recording systems for tele presentation in the projection room itself since the film projectors are close at hand. Indeed, wherever film recording is used, (that is, the intermediate-film tele-projection system) the projection room offers major advantages as a location.

However, there are certain limitations to the projection-room location for tele projection. The room size likely will require an increase, and this in turn will lead to considerable structural changes. The added weight of equipment will, in turn, demand other structural changes for strengthening the supporting members. Since a considerable added amount of electrical (or even film-processing) equipment will be placed in the projection room, care will be required to be certain that no novel physical or fire hazards are introduced. Unless the intermediate-film process is used for tele, the long throw to the screen may not fit too well with presently available tele-projection systems. And, as usual, keystone correction will be needed.

Sound-Reproduction Methods

From all of the preceding it can be seen that the desirable location in the case of any particular theater depends on whether the intermediate-film process or the direct-projection process is used for theater television and also upon the dimensions and physical construction of the particular theater and its projection room. Obviously no general

prescription can be used which will be guaranteed to bring perfect health to television in every theater.

For economy, convenience, and availability of staff training, it is probably best at this time to produce the sound accompanying tele programs directly from the film amplifiers and stage loudspeakers. In effect, this amounts to introducing the received sound into the circuits associated with the sound-track output of the film projector.

However, it may prove desirable to modify the frequency characteristic of the reproducing system for tele in order to secure the most natural and desirable quality of reproduction. Since changeovers from motion pictures to tele and back again may become increasingly frequent, it will be necessary to have a simple and error-proof changeover system, presumably suitably interlocked.

Color-Tele Methods and Problems

Large-screen color television has been demonstrated successfully. Certain considerations indicate that color tele in theaters should be introduced after considerable experience has been gained in

monochrome and after further developments in color television have been carried out successfully.

Because of the use of color filters, color tele requires considerably more light from the original projection tube or tubes or, alternatively, the acceptance of a smaller picture for identical brightness. While certain ingenious technical expedients enable this factor partly to be overcome, it is sure that the light-producing efficiency of color-tele equipment is unlikely to equal, or even closely approach, that of monochrome tele equipment.

Further, color tele requires considerably more elaborate and costly apparatus. The radio or cable channels for program syndication must transmit a far wider block of frequencies for color tele than for monochrome, with correspondingly increased first cost and maintenance charges or rentals as the case may be. Color-tele equipment is also more complicated than monochrome equipment and may require skilled handling and maintenance.

Color film is a precise product which,
(Continued on page 23)

Effective Colored Cutaway Display by Ampro Projector

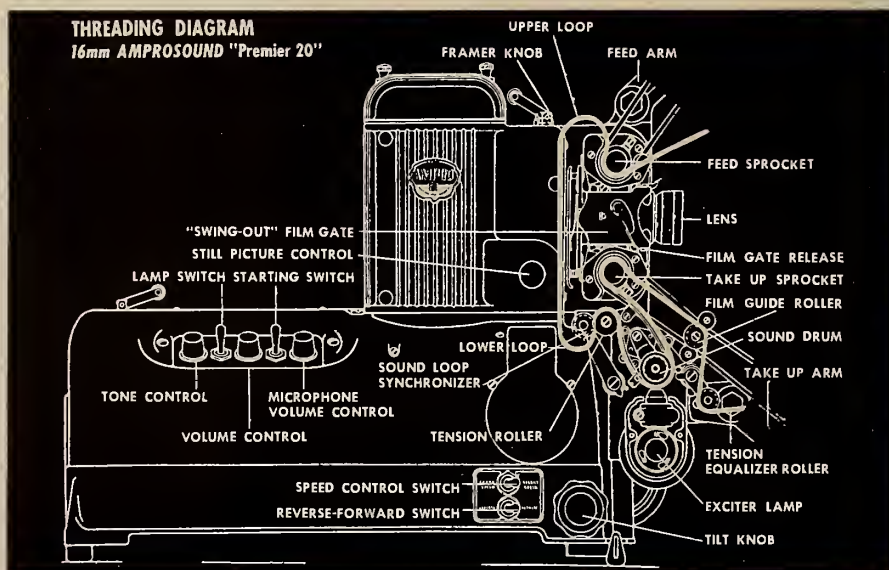
One of the most unusual and effective displays ever devised for the non-technical groups interested in projection work has been brought out by Ampro Corp., manufacturers of 16-mm sound-projection equipment. Smaller reverse drawings, like that reproduced here, are available to projectionists and other technical personnel so that instant reference may be had to the film path and other unit components.

The large display is 35 inches wide by 29 high, is printed in seven colors and

is varnished so as to give added glow to the colors. The entire movement of the film through the projector, how the picture is projected, and how sound is reproduced is presented visually. The drawing demanded such careful study of separate parts and such precise duplication of the entire mechanism that it required months of work by leading industrial artists.

Additional copies of this unique display available to all interested organizations direct from Ampro Corp., 2835 N. Western Ave., Chicago 18, Ill.

Details of film path and other important units of Ampro Premier 20 sound-film projector.



Presenting: Leroy A. Wilson

Recently Elected President of American Telephone & Telegraph Co.



Leroy A. Wilson

NEIGHBORHOOD movie-goers at the Swan Theatre in Terre Haute, Indiana, cheerfully paid a nickel for the best cinema entertainment the year 1915 could offer. How much they enjoyed the show depended largely on the good right arm of a future president of American Telephone & Telegraphy Co., considered by many economic to be the best managed industrial organization in the world.

Projectors in those days were cranked by hand, and Lee Wilson, 14 at the time, did the cranking in the projection "booth" (literally) of the Swan. He considered that this was a step forward from his first job of ticket-taker; later he graduated from the "booth" and took over the piano down front. After the final clinch the pianist turned again to more prosaic duties, including taking the film down to the express office and picking up the next night's show.

Arm Muscle Chief Requisite

The projectors in the Swan, a 600-seat house, were hand-driven Powers. Programs were changed daily and at first consisted of a two-reel "feature" and a one-reel comedy—admission a nickel. Later when longer features were used the price went first to ten and then to fifteen cents.

Wilson recalls that the first two-reel feature used was "Officer 666," and that the first serial run in the Swan was "The Million Dollar Mystery," with Margaret Snow and James Cruze.

Wilson early had to go out and pitch for whatever cash he wanted to have in his pocket. His first venture was one of his most successful: he obtained a newspaper route and kept it for seven

years until he had graduated from college. Meanwhile he plunged into an astonishing variety of jobs, but he had the presence of mind to sub-let the paper route whenever one occupation threatened to collide with another.

For several summers starting in 1914 Wilson took temporary leave of his movie chores to work for a manufacturer of pots and pans. His task was to rim with black enamel the edge of pot or cup, and also the handle, before the utensil was put in the oven to be fired. This operation, performed with the fingers, was paid for at piece rates. Wilson doesn't recall exactly how much he made, but thinks he averaged about \$3 daily, or \$18 a six-day week.

The Merry-Go-Round Gets Started

In 1918 Wilson entered Rose Polytechnic Institute in Terre Haute. His activities now really began to multiply. He had fooled around with a trumpet, so now he joined a dance orchestra and on Saturday nights blew himself to a few dollars. For some time past, on Sundays, he had played trumpet solos at the Methodist Church; Art Nehf, who later pitched for the N. Y. Giants, at one time played the organ accompaniments.

By 1918, then, young Wilson had managed to get his diverse activities into a nice balance. He then tackled other jobs in order to pay for his schooling. He did surveying work week-ends in the mines of a local coal company. He shovelled ore, and as his engineering knowledge increased, he worked for the Pennsy R. R.—one summer as engineer in charge of a line construction crew, another summer in designing bridges. In the same period he supervised considerable county highway construction and did various jobs for the water works.

None of these activities, however, prevented him from winning membership in Tau Beta Pi—honorary society in engineering equivalent to the Phi Beta Kappa award in non-engineering college work.

Meteoric Career in Telephony

Joining Indiana Bell Telephone in 1922, Wilson spent seven years in the traffic department before transferring to A. T. & T. in New York. Here, too, he did traffic work, but also gained experience in dial equipment engineering and related fields. By 1940 he was rate engineer, and in 1942 he was appointed head of the entire commercial division

of the Operating and Engineering Department.

Promoted to vice president in 1944, Wilson made an exhaustive study of Bell System revenue needs. In June 1946 he was made financial vice president. In less than two years he was made chief executive of the vast A. T. & T. organization.

Wilson believes profoundly in the democratic idea and unconsciously shows it. He meets people in a completely natural way; anyone can feel at ease and speak his mind, for Wilson is a good listener as well as a good talker. He is a tremendous worker himself. He is a 32nd degree Mason and a member of Lambda Chi Alpha fraternity.

Now don't you guys, presuming a trifle too much on Wilson's status as a brother craftsman, go telephoning him (collect) to complain about wrong numbers or to ask for preference on a new phone. But if sheer perversity should triumph, *don't* whatever you do send him a telegram.

How Much Light to Affect a Single Photographic Grain?

About 40 of the tiny particles of light known as "quanta," which travel at 186,000 miles a second, must strike a single photographic grain of silver bromide before it can be developed. This conclusion is reported by Dr. Julian H. Webb of Kodak Research Laboratories.

Dr. Webb said that the total energy of the 40 quanta, when transmitted in the average photographic exposure time of 1/100th of a second, is about two quadrillionths of a watt—an infinitesimal part of the energy required by an ordinary light bulb. Photographic emulsions generally have many silver grains suspended in depth. Dr. Webb used special plates made by diluting a regular emulsion and spreading it on optically polished glass until the emulsion layer was only one grain thick.

Series of Precision Tests Made

He found the number of grains per square centimeter in these single-grain-layer plates by microscopic count, then exposed the plates to light of known energy. Using the microscope again, further counts were made of the developed and undeveloped grains for successive steps in exposure. Information obtained was used to plot "characteristic curves" which show exposure and density or the number of developed grains. Further study was made statistically in an attempt to find the number of quanta actually used in the formation of the latent photographic image.

Dr. Webb said results indicate that probably not more than 10 of the 40 quanta absorbed by each grain are actually used in formation of the minute silver speck believed to start photographic development. Some of the quanta, he feels, may go to forming internal specks or in building up other small specks of silver scattered in the grain, none of which necessarily contributes to the "trigger" speck.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

WHILE well aware of the tremendous expansion of 16-mm activity, as recounted in this department from time to time, we were hardly prepared for the mass of information supplied by a prominent 16-mm equipment manufacturer during a recent discussion in this office. The manufacturer, an old friend of ours and a good friend of the organized craft, covered the 16-mm field in terms of itinerant exhibitors, which have increased enormously in the past year, particularly in Canada and in the southern part of this country; of educational and industrial showings, and of the growing tendency to spot 16-mm units in the smaller theatres.

Warning signals to the end that the craft be on its toes in connection with 16-mm developments have appeared herein frequently; but our manufacturer friend gave as his opinion that craft efforts to date in this direction, no matter of what dimension, fall far short of what is needed to guarantee continuing craft dominance and security in this field.

Although many of the larger Locals have organized special 16-mm groups for the training of their members, with these

men being given the preference on all 16-mm calls, it seems to us hardly enough to confine such activities to the urban centers. The craft must be prepared as a whole so that sponsors of 16-mm showings will *automatically* turn to IA men for such work, regardless of locale. This means that even the smaller Locals will have to be assured of at least one man, and preferably more, who can handle efficiently any 16-mm showing, *on any type of equipment*. This program will require a bit of doing and probably a bit of sacrifice of time, money and effort on the part of the smaller Locals, but if eternal vigilance be the price of security, that price will have to be paid.

Remember: not tomorrow, or next week, or next month, or next Fall, but NOW.

• Bill Thompson, business agent for Pittsburgh Local 171, advised us that a new local ordinance pertaining to sanitary facilities in projection rooms which was recently presented gives the exhibitors in his area six months in which to comply with the conditions set forth therein. The number of IA Local Unions trying to

effect decent sanitary facilities for their members is growing daily, and we hope the day is not far off when all projectionists will be accorded the same consideration given to workers in other fields.

• New York City Local 306 has organized a 16-mm department under the direction of Charlie Kielhurn, member of the executive board. Members interested in 16-mm work are instructed in the operation and maintenance of this equipment. A record is kept of all men proficient in 16-mm projection, and no member may accept work in this field without a permit from the Local. The rapidly expanding 16-mm field promises much gainful employment to IA men everywhere.

• New two-year contracts recently concluded between Westchester County (N. Y.) Local 650 and the RKO and Loew circuits call for a 7% wage increase for the first year and an additional 3% increase the second year of the contract. Working conditions remain unchanged: two men per shift, six-day work week, and two weeks vacation with pay. Congratulations to Emil Smith, president, and Fred Thome, business agent, for a fine settlement.

• We were happy to meet again with Herbert Aller, secretary-business agent of Hollywood Cameramen's Local 659, when he visited New York early this month. Aller and William H. Strafford, secretary-business agent of Chicago Cameramen's Local 666, who was also in town, went into a huddle with the General Office on new wage negotiations for their members.

• At the request of Charlie Wheeler, secretary of Geneva Local 108, and Earl Tuttle, business agent of Binghamton Local 396, both officials of the New York State Association of Motion Picture Projectionists, we represented the Association at the State Federation of Labor meeting held in New York City last month. The special meeting was held to organize the Labor League for Political Education, and we were tremendously

BRIDGEPORT, CONN. LOCAL 277 SPONSORS TESTIMONIAL DINNER TO PETER BENARD

Peter Benard, extreme right, honored by Local 277, which he helped to organize 35 years ago. Benard, president of the Bridgeport Central Labor Union, has played a leading role in the labor movement for over half a century. Representatives of all groups in organized labor attended the banquet, several of whom came from distant points. IA President Walsh presented Benard with a gold honorary membership card in the Local.

Union officials pictured above are (left to right): Fred Letis, secretary; LeRoy Nickerson, financial-secretary; Mrs. Nickerson; John A. Martin, business agent; Roland J. McLeod, president; IA President Walsh; Mrs. Martin; Frank Toth, vice-president, and Benard.



impressed with the serious efforts being made to defeat in the coming elections those legislators who voted in favor of the Taft-Hartley Law.

• F. Clyff Fredrickson, former president of Local 441, Ottumwa, Iowa, has entered the race for United States congressman



Clyff Frederickson

from the Fourth Congressional District of Iowa. He was chosen by the Ottumwa Trades and Labor Assembly as being the one most likely to defeat the present congressman, Karl M. LeCompte. Fredrickson, 41 years old this month, has had no previous political ambitions, his expressed

reason for seeking office now being that he doesn't think the incumbent represented all the people and that he (Fredrickson) was dissatisfied with LeCompte's record, particularly in the 80th Congress. In a recent interview Fredrickson stated that "If we are to have a strong nation, we must avoid class distinction."

The members of Local 441 are very proud of their brother member, and we join them in wishing Fredrickson a most successful campaign.

• Brooklyn Stage Employees Local 4 celebrated its 60th anniversary last month in conjunction with the 10th District's bi-annual dinner. The celebration was held in the Grand Ballroom of Brooklyn's St. George Hotel and was attended by many city officials and members of New York legislative and judicial bodies.

IA President Walsh, who is also president of Local 4, was the guest of honor. He made a brief address to the gathering, later introducing Father Francis A. Growney of Buffalo. Father Growney will be remembered by the delegates to the 1944 St. Louis Convention for his hilarious address in which he related his experiences with stagehands' locals when he was a producer for the Theatre Guild in Buffalo.

Other speakers were Vincent R. Impellitteri, president of the New York City Council, and Thomas A. Murray, president of the New York State Federation of Labor. Tom Murtha, 10th District president and business agent for Local 4, was toastmaster.

In addition to President Walsh, the General Office was represented by Wm. Perrin Raoul, James J. Brennan, and Thomas J. Shea. The 10th District executives present, in addition to Tom Murtha, were H. Paul Shay, Elmira Local 289; D. R. Rood, Utica Local 128; Michael J. Mungovan, Rochester Local 25; J. C.

McDowell, New York Local 1; Sal J. Scoppa, New York Local 52; A. F. Ryde, Buffalo Local 233.

Representing various IA Local Unions were Danny Gill and Red Schaffer, Buffalo Local 10; Solly Pernick, John Garvey, Louis Yeager, Joseph Dwyer, and Harry Abbott, New York Local 1; Fred Boekhout and Allen Tindal, Rochester Local 253; Emil Smith and Fred Thome, Westchester Local 650; Herman Gelber, Harry Storin, Morris Kravitz, Artie Silverman, Dick Cancellare, Herman Boritz, Bill DeSena, Charlie Eichhorn, Mike Springer, Eddie Stewart, Sam Salvino, Jimmie Ambrosio, and Nat Doragoff, New York Local 306. Tom Green and Harry Oppenheimer of Newark Local 244 headed a delegation of 52 men from New Jersey's 14th District.

Illness prevented Barney Ryan, the one remaining charter member of Local 4, from being present. However, another oldtimer of the Brooklyn Local was present—Dave Berk, the oldest living ex-president.

Among the invited guests were Martin Lacey and James C. Quinn, Central Trades and Labor Council of Greater New York; Supreme Court Justice Powers; State Senators Santangelo and Hanna; New York City Clerk Kelly; Joseph R. Vogel, Loew's, Inc.; Major L. E. Thompson, RKO; Si Fabian, Fabian Theatres; Edward Corsi, New York State Labor Commissioner, and Louis Marciante, New Jersey State Federation of Labor.

Also present were Lester B. Isaac and M. D. O'Brien, Loew's, Inc.; Bill Turnbull and Allen Gordon Smith, National Theatre Supply Co.; Admiral R. B.

Tompkins, W. G. Gaylord, William Borberg, Arthur Meyer, Ed Worfolk, and Herb Griffin, International Projector Corp.; Harold Williams, Duwico, Inc., and Ralph Long, formerly general manager for the Shubert interests.

• Our good friend C. E. (Red) Rupard of Local 249, Dallas, Texas, became a grandfather when his daughter gave birth to a baby son. It seems but a short time since we both were a couple of gay buckeroos down Texas way. Congratulations, Red, and should we say "Many happy returns of the event?"

• One of the busiest nice fellows (who seems constantly to be slipping away from our motion picture circle by dint of steady advancement) is J. R. Little, recently named region manager of the RCA Victor Division over the territory from New England through the District of Columbia.

Happily, J. R.'s new setup is closely tied in with television, thus the craft might again get close to him by means of the turn of events.

• The 35th anniversary celebration for New York Local 306 will be held October 24, 1948, in the Grand Ballroom of the Hotel Astor.

• Atlanta Local 225 will be represented at the forthcoming IA convention by delegates Jake Pries, business agent, and Fred J. Raoul, son of Wm. P. Raoul, IA secretary-treasurer.

• A demonstration of the Ampro 16-mm projector was held recently in the meeting rooms of Dallas Local 249 before a gathering of about 125 members. Lou Walters, district manager for Ampro,

(Continued on page 28)

LOCAL 510, FARGO, N. DAK. PARTIES EARL J. McCANNEL ON HIS 25th YEAR AS OFFICER

Pictured here are officers and older members of Local 510 as they gathered at the American Legion Hall in Fargo, N. Dak. last month in celebration of the silver anniversary party tendered Earl J. McCannel on his 25th year as secretary-treasurer of the Local. Left to right: Roy McCannel, charter member; Earl J. McCannel; Walter Dunkelberger, sgt.-at-arms; George Ferris, charter member and bus. agt.; Carl Leaf, vice-pres.; John Strandjor, charter member; Henry G. Lehr, William Smith, and Leslie G. Ferris, pres.



New Westrex Sound Systems 15-100 W. Feature Advanced Design Units

IMPROVED performance and ease of maintenance mark a new series of theatre sound systems for the foreign market from Westrex Corp., export and service subsidiary of Western Electric. Many new features are incorporated in the line, which consists of three basic systems—the Master, the Advanced, and the Standard. In each of the systems, various combinations of components may be made for various requirements in sound level and theatre coverage.

The soundheads all incorporate the flutter suppressor (1948 special Academy award) which operates on hydraulic principles to cut flutter to a point less than half the Academy standard. Constant film speed is maintained by a magnetically-operated electro-tension governor.

Among other features of the ruggedly constructed soundheads are push-button changeover and individual volume control. Flexible coupling and straight line drive are included, together with a hand wheel for simplified threading and vertical drive ball-bearing motor.

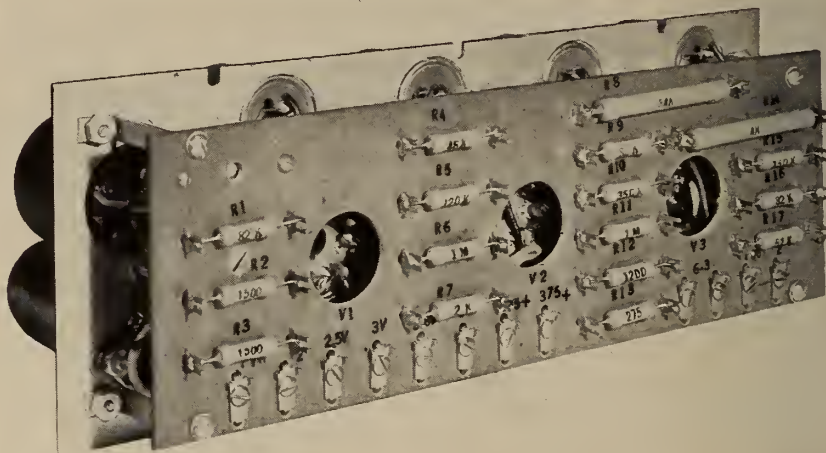
Miniature Plug-in Pre-Amplifier

A prominent advance in the Master and Advanced systems is the A6 plug-in type photocell amplifier. The usual permanent style mounting of this pre-amplifier has been dropped in favor of mounting on a separate chassis with a plug-in base similar to that on a radio tube. Since an automatically focused and pre-set photo-electric cell is included on this chassis, it is possible to remove any

photocell or pre-amplifier trouble merely by pulling out the chassis and replacing it with a spare unit. Another advantage is the small size of the amplifier—little larger than a pack of cigarettes—which makes possible a substantial reduction

amplifier rack, while a unit switch provides an additional emergency safeguard by furnishing a-c to the exciter in the event of faulty functioning of the rectifier unit.

Complete redesign is featured in the amplifiers of the new systems. Double full-length doors at the rear of attractive floor-type cabinets permit installation close to the wall, calling for little space and providing convenient access



Heart of Westrex system is this A-9 amplifier, a voltage gain or driver unit. This critical section mounts on power amplifiers of all systems, can be replaced by a new unit within a few minutes. Only replacement tool needed is a screwdriver.

in wiring with consequent improvement in signal-to-noise ratio at a point in theatre sound systems where noise is most critical.

The soundhead of the Master system is provided with two exciter lamps mounted on a swivel base, permitting instant replacement in the event of lamp failure. Each projector has an individual lamp rectifier mounted in the

to the rear servicing area. Easy access to spare parts is assured by mounting them on the inner wall of the cabinet. White enamel finish of the cabinet interiors and an electric light contribute to accessibility.

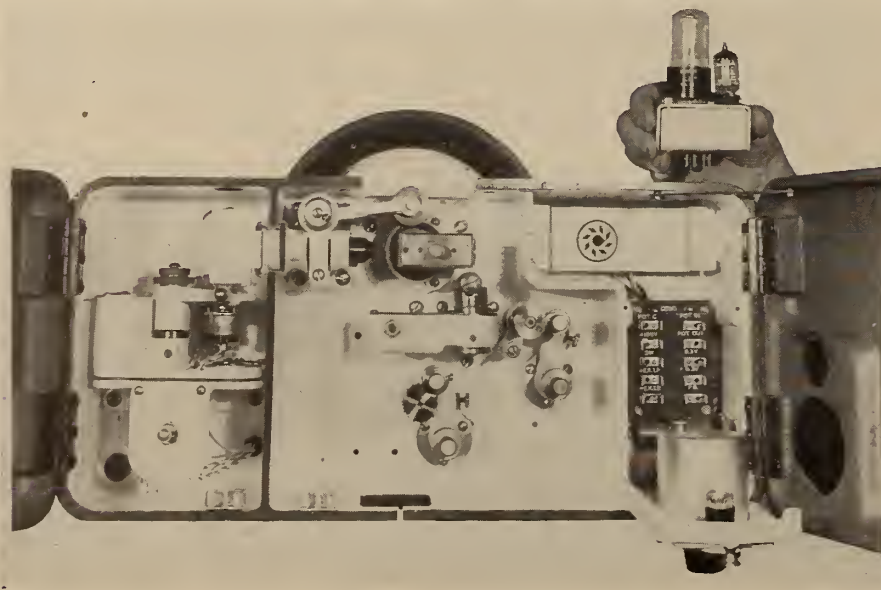
Power Range 15 to 100 Watts

Power amplifiers of the new series are rated at 15, 40, 50, and 100 watts output, conservative ratings on the basis of an allowable distortion of about one-half that permitted by Academy standards. Equalizing facilities are provided for each amplifier, permitting separate attenuation or reinforcement of either high or low frequencies without affecting the other and making possible more natural sound reproduction regardless of the shape or size of the theatre while giving optimum level for all frequencies.

A new development in the theatre field is the introduction in each of the new systems of a voltage gain or driver amplifier unit which is common to all the power amplifiers. This section, constructed as a separate unit, fits into the chassis of each size of amplifier, from the 15-watt to the 100-watt units. The driver amplifier, which may be inserted or speedily detached with only a screwdriver, is an additional protective measure.

Each of the systems has a separate fuse and switching panel for the amplifier power line as well as an individual

Soundhead of 1948 Westrex system showing position of the small plug-in type pre-amplifier at upper right. Amplifier itself is held in the hand shown behind soundhead.



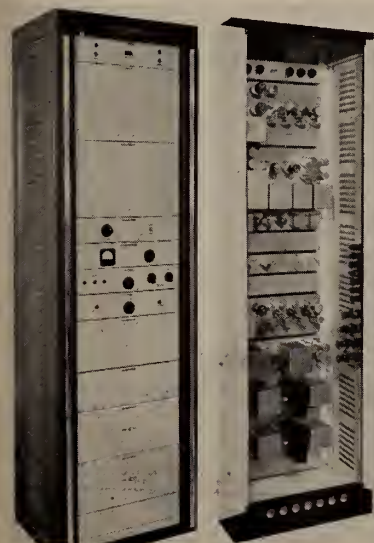


L-12 Westrex loudspeaker system, one in the new line of W.E. units. Ample baffle, of course, is provided at sides and bottom.

d-c power supply for each amplifier. Separate rectifier units are provided for each exciter and are equipped with switch control for emergency use of a-c should the rectifier operate improperly.

A separate amplifier, used in these systems for monitoring, may also be used for supplying hearing aids, cry room and lobby ballyhoo speakers. Mounted on its own panel on the rack, the possible failure of this amplifier cannot affect operation of the main system. An optional accessory which may also be mounted in the cabinet is a

Front and rear views of Westrex amplifier rack, including from top to bottom: switch panel, A-11 amplifier, R-11 rectifier, A-14 amplifier, metal panel, two control panels, A-10 amplifier, R-9 rectifier, and two R-10 rectifiers. Ready accessibility of components aided by double doors at rear to conserve space.



non-sync amplifier for stage presentations and the playing of recordings, although the film amplifier may be so used if desired.

All the systems have separate power supply for the change-over relays, which are assembled together on a small panel.

Several New Design Factors

Several design factors in these systems enhance the quality and aid ease of maintenance. High quality paper condensers, for example, have been used in many instances instead of the less reliable and shorter-lived electrolytic type. When electrolytics have been employed, they are of the new plug-in type, making the replacement of defective units extremely simple.

The new 1% tolerance type resistors recently developed by Bell Labs. are used throughout. The unusually low inherent noise level, permanence of characteristics, and precision workmanship of these resistors help to keep total harmonic distortion of the systems

well below Academy standards. Used throughout is the new type plastic-covered wire and specially designed transformers which are moisture-sealed against high humidity.

For greater ease of maintenance, voltages are clearly marked across all critical points. A test panel indicates circuit conditions at 11 points in the system—or 22 points if an emergency system is also used—merely by the rotation of a single switch.

The new systems use the recently introduced W. E. loudspeaker units which make up the backstage equipment.* Eight different speaker systems are available to handle required outputs coverage angles, assuring proper coverage of the smallest as well as the largest theatres regardless of shape.

This new equipment is described in a 32-page brochure now available through all W.E. distributors.

* "W.E.'s New 8-System Theatre Speaker Line"; IP for October 1947, p. 5.

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, American Federation of Labor

XIV. Special Departments Within American Federation of Labor

THE special departments, functioning under charters granted by the A. F. of L., created a unity between many internationals which had previously been impossible. What was equally important, the departments enabled the unions to act collectively, instead of as separate units, when dealing with employers. The departments were authorized to charter local units, the result being that local Building Trades Councils, Metal Trades Councils, Railway Division Councils and Union Label Councils soon covered the country.

Department Conventions Vital

From the beginning these departments held annual conventions, which met immediately before the Federation's convention. The great majority of the delegates to department conventions were also delegates to the conventions of the A. F. of L. The department conventions served to make its delegates acquainted with the progress made during the year, and the particular and pressing problems which faced them. As one result they were better prepared to discuss and act upon the questions coming before the Federation's conventions.

The principal objective of the departments was to establish a greater degree of cooperation among the internationals. To give effect to this purpose local councils jointly negotiated with local employers. The practice of negotiating joint

agreements with employers covering all internationals whose members were employed developed so widely and successfully that this type of agreement became the rule instead of the exception.

Previously each trade had been forced to deal separately, a condition which gave the employer altogether too much opportunity to play one craft against the other. Under the department form of organization, with its local councils, the crafts acted as a unit in negotiating collective bargaining agreements.

In time a further and quite significant policy developed. The departments of the American Federation of Labor had frequently taken part in negotiating agreements with large corporations, becoming signatories for all of their affiliated organizations. This gave their members a form of assistance which was materially helpful.

Joint Agreements by Departments

In the summer of 1934 the Building Trades Department and the Metal Trades Department took a particularly forward-looking and constructive step. They jointly negotiated an agreement with a large mining corporation which covered all of its mining operations in the State where its mines, smelters and refineries were situated. Among the crafts employed by the mining corporation were carpenters, painters and teamsters, prop-

erly affiliated with the Building Trades Department but not eligible to be part of the Metal Trades Department because they were not metal workers.

It would have been confusing for either department to attempt separate negotiations with the corporation. When they did so jointly a most practical and constructive step was taken. It was approved by the corporation, by the internationals whose members were affected and, what was of importance, by the local unions. Since then the two departments have jointly negotiated agreements with a number of large corporations.

This policy results in but one agreement covering all wage-earners' interests. It affords assurance that observance of the provisions of the agreement will be maintained by all local unions, for such agreements are signed by each international and, in turn, they are underwritten by the two departments. Trade union discipline of a high order is an important result. In addition, a much closer bond of common interest between all of the crafts is established.

As the departments were meeting the far-reaching changes resulting from modern processes and specialization in industry, including mass production, the craft internationals were shaping their policies so that they could keep abreast, retain their capacity to protect their members and prevent specialization from dividing the membership or splitting them into separate organizations.

Conditions Dictate Policies

Modern industrial processes of necessity prevented a craftsman from being equally competent in all of the divisions into which his craft was developing. The type of craft guild of the medieval period was no longer feasible. The craft internationals, or many of them, because of their character, developed into organizations composed of numbers of groups, each highly skilled in the branch of the trade in which it was employed. The term "craft" is now much more flexible than it was at the beginning of the present century.

Consider the International Brotherhood of Electrical Workers and the International Association of Machinists. Originally these organizations were known as pure craft unions. Every member was presumed to have the skill to do any of the work called for in his industry.

Now we find members of the Electrical Workers employed in diverse activities all within the field of the electrical industries. In the building trades they wire buildings under construction for electricity; they put up the telegraph, telephone and transmission wires, or place them underground; they install the complicated telephone switchboards and the automatic transmitters. In electrical man-

ufacturing plants they fabricate modern equipment for warships, while afterward other members install it in the vessels.

The highly trained electrical worker is the key man in every hydroelectric powerhouse. Without their trained skill our radios and the radio stations could not operate. Electrical workers erect, install and service all the electrical equipment of our railroad systems. With electrical equipment in manufacturing plants and in the homes, it is essential that a large force of competent service men should be ready to make the electric stove

operate as it should, repair the electric flat iron, cure the sick radio and perform an almost endless service in the home, the office and the manufacturing plant.

All of these electrical workers are members of the same international union, paying the same dues, receiving the same fraternal benefits and enjoying the same protection. The craft has expanded, but the *craft interests* of its members remain unchanged regardless of the special field in which they are employed.

The scope of the Machinists also serves
(Continued on page 30)

New Simplex In-Car Speakers Provide Quality, Durability

THE housing of the new Simplex in-car speaker consists of two die-cast aluminum sections fitted with a lap joint and held by four rust-proof screws. The aluminum alloy used is of very high tensile strength. The front section carries all the weight of the unit and volume control for proper balance and to facilitate installation and removal. Curved louvers pass the sound through the housing so that no water will drain off onto the speaker cone.

The rear section forms a graceful "throat" long enough to enable attachment of the speaker to the car window, with the latter open only about an inch. The cord, brought through this throat, so emerges from the window hook that the window can be almost entirely closed during inclement weather. The speaker cords will not tangle. Drain holes insure that all water, even that resulting from condensation, drains out completely.

A 4-inch Alnico V P.M. speaker attaches to the front section by means of rust-proof screws. The response characteristic provides plenty of bass for music and yet sufficient h-f response for ideal speech reproduction. The cone is Cero-seal-treated to make it weatherproof, as is the voice coil mounting so as to as nearly as possible eliminate voice coil "rubbing." The magnet is much heavier than normally supplied, to increase overall efficiency. The basket supporting the cone prevents the speaker cable from touching the cone and causing raspy response.

New, rugged Simplex in-car speaker stand.



The L-pad type volume control is completely enclosed so that the windings cannot be damaged. The wiring assures constant impedance no matter whether the control be fully "on" or "off." Varying the volume in one or several speakers does not affect the overall speaker balance.

A cast aluminum control knob fastens to the volume control by a spring and clutch arrangement. No screws are used and patrons cannot remove the knob nor can it loosen through use or wear. The entire knob is recessed into the speaker so that it cannot be broken even when dropped. A complete Simplex speaker weighs slightly over 2½ pounds.

Coupling Unit Provides Security, Facility

The coupling unit provides a mounting for the speakers and a "box" for connecting the cables to the ramp wiring. It is fastened to the post without the necessity of threading and providing pipe flanges. The casting fits a standard 2-inch pipe; but an adapter enables mounting to a 1½-inch post.

The formed baskets holding the speaker are covered with Neoprene molded to the metal. Neoprene is preferred over rubber since it withstands sunlight and moisture much better. Two such baskets provided with each coupling unit are fastened by two set screws inside the unit itself, thus simplifying removal and replacement.

An aluminum dome covers the entire coupling unit, removal of which permits work in the open where all connections may be easily made. A convenient terminal strip prewired to the transformer is available for connections to the underground cable and to the speakers. Lugs are provided on the "line terminals" so that the electrician may either break the underground wire at this point and attach the lugs to it, or may discard the lugs and loop the underground cable around the terminal post.

The matching transformer used in the coupling units is vacuum-impregnated to prevent rusting. Rubber and wax coated transformers are not suitable for continuous outdoor use because they allow moisture to get at the transformer windings. A vacuum-impregnated transformer is completely sealed from outside to inside.

Cable clamps are provided on the inside of the coupling unit for the speaker cables so that damage to the terminal strip or to the underground cable connections cannot result from a sharp pull on the cable. Distribution of these Simplex drive-in speakers is through National Theatre Supply.

THEATRE TELEVISION ANALYSIS

(Continued from page 16)

at this time at least, is in relatively short supply. Indeed, it is not known whether the existing or projected color-film manufacturing facilities would be capable of meeting the requirements were color television to be generally adopted. This condition may persist for many years, since the successful manufacture of color film is a difficult art of high precision.

Color film is also far slower than monochrome film. This, in turn, would restrict the range of time and subjects which could be recorded for tele purposes.

In the theater itself, the intermediate-film process for tele projection would require color film of sufficient sensitiveness to enable photographing the incoming program in color, together with the capability of high-speed processing in the theater. So far as is known, color film which can be processed at high speed for such theater purposes is something for future accomplishment rather than present commercial availability.

Color tele does offer attractive possibilities in the future. Color presentations are, in general, superior artistically and dramatically to black-and-white presentations. It is therefore hoped that, within the next decade or two, color tele also may find its place in theaters.

Cost Factors Variable

The major cost factors which must be considered by the exhibitor entering the field of theater tele include the following. Some of these factors are major; others are relatively small.

The first factor is the making of a systematic survey of a theater and a study of appropriate methods of introducing tele. It would be a major error, in a new field of this sort, for an exhibitor to enter theater tele uninformed as to its general characteristics and without data as to the most suitable way in which tele equipment can be installed and operated. Such surveys can be conducted by trained technical and program men who have been active in tele.

Following a survey, the exhibitor presumably will place an order for appropriate equipment. The various results of this analysis or survey will indicate the general nature of the equipment which he may select. Clearly, a small theater in a town of medium size will probably find a different solution advisable from a large theater in a great city. It then becomes necessary to install such equipment in neat and reliable fashion. This is handled in much the same way as the sound film equipment.

Once installed, the equipment will require a certain amount of maintenance and servicing. This can be arranged

with appropriate agencies. Modern tele equipment for theaters will require only a reasonable amount of maintenance.

Regardless of the type of equipment which has been selected, the theater staff will require training in its daily use. The staff must further acquire skill in smoothly changing over from motion pictures to tele and back again. The size of the staff which can handle both types of programs will require analysis, and perhaps some negotiation.

Theatre Tele Programming

The exhibitor of necessity must find an available source of tele programs. He can hardly depend upon tele broad-

casting for that purpose because of certain restrictions and also because the theater owner, in general, will desire *exclusivity* of use of his program in his own neighborhood.

The tele programs to be shown may in part consist of film material which is sent from a central transmitting station to a group of subscribing theaters. The cost of such a service will of course depend upon the cost of the program and the cost of carrying it to each individual theater in flawless shape.

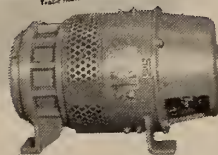
Another portion of the tele program may consist of live-talent presentations. Here again is a cost factor depending upon quality of the talent and perform-

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needed only a set
of new brushes!



THE statement of this operator* is representative of the satisfactory experience of thousands of users of Hertner Transverters all over the world.

After 5½ years of operation he at first thought his Transverter was due for an overhaul. But only a new set of brushes was necessary and the Transverter was good for many more years of service . . .

*Name on request.

User experience like this proves that with Transverter equipment you are sure of:

- (1) reliable performance.
- (2) constant screen illumination.
- (3) quiet operation.
- (4) low operating cost.
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"I can't see what this guy has to holler about," wrote a Louisiana theatre operator. "Right this minute I am using a Hertner Transverter which I bought in February, 1928, and it has been in constant use ever since—never missed a 'pop' since then, and the commutator has been cut only three times in all that time."*

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Equip your projector with a Hertner Transverter for reliable performance, constant screen illumination, quiet operation, low operating cost, and long life.

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THE HERTNER ELECTRIC COMPANY
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ance, and the cost of carrying the program to each theater.

The total cost of a program is, therefore, the sum of at least two elements, namely, the program cost itself, and that of carrying the program to the theater (that is, of syndicating it). Possibly these elements will be combined into a single charge, in much the same way in which films carry a charge which includes actual delivery.

It is clear that the greater the number of theaters which can use a given program at a particular time, the less may be the program cost per theater. Here again we encounter the overwhelming advantages of large-scale syndication which, accordingly, presents a major problem, and also an opportunity to the theater-tele field.

Program Problems, Possibilities

The problems of programming in theater tele are, strictly speaking, not all outright engineering problems. They are, however, so closely tied in with the engineering techniques and apparatus that it is appropriate briefly to refer to them at this point.

It is of course evident that theater-tele programs must fit into the schedule of film presentations without awkward gaps or abrupt and undesirable changes of mood or subject matter. Accordingly,

program planners will face the problem of fitting tele film material into a unified and interesting performance.

However, when events of supreme importance occur, "transcendental news events," it may be necessary to throw all everyday rules into the discard. In such an instance good showmanship might even involve interrupting everyday material to make way for something that is unique and of possibly tragic interest to the entire audience.

A number of types of television programs suitable for theater presentation are fairly obvious of acceptance. Thus, news events will have real interest. So will sport events, or crucial parts of such sports events. It will be quite a problem to fit the best parts of a baseball or football game, for example, into a theater presentation. The top events in a circus, or rodeo, being capable of prescheduling on an accurate basis, afford more flexibility and therefore more readily usable material.

There are some legal matters that will require attention. Undoubtedly copyrights will exist on the picture and sound (or speech) of practically every presentation, except news events. The rights of the copyright owners in music will require attention. Patent rights may be involved in equipment and circuits. And there may even be some rather interest-

ing legal questions in connection with so-called "violation of the right to privacy" in such states as will not permit the public display of photographs of living persons or episodes in their lives without their previous permission. It may be mentioned that some states do not recognize this right to privacy while others do, thus complicating the situation in connection with the national syndication of news events.

Urban Program Syndication

In a key city, there are usually theater chains controlling a considerable number of theaters, smaller theater groups, and individual theaters not affiliated with any larger group. When tele programs become available for syndication, methods will be required to sort out these various theaters in accordance with their tele needs.

Obviously, the extremely large groups of major theaters might be able to afford their own tele programs, syndicated exclusively to them and perhaps to a limited number of relatively non-competitive independent theaters. Smaller groups of theaters likely will have to form a coalition among themselves, and with the probable addition of some independent theaters, to build up a group justifying a special syndication service.

Each group of theaters, which has its

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own tele programs and syndicates them to its members, necessarily will require central studios for live-talent production and a central projection room for film transmissions. However, several such syndicating agencies might readily rent (or own) studio space in a single building or group of buildings devoted to theater-tele program production.

On the physical side, the actual syndication of programs can be by one of the following methods:

The simplest method, though perhaps not the most economical, involves the use of specially quiet telephone lines which are equalized to the extent necessary for excellent picture transmission and which have repeater stations sufficiently close together to prevent the intrusion of "noise" into the picture. This system has the advantage of utilizing facilities which may be available, but it does require some changes in wiring at the telephone exchanges and the addition of considerable amplifying and equalizing equipment. The sound channel naturally presents no problem, being practically identical with a high-quality standard broadcast circuit.

Tying-In Groups of Theatres

Another method is to run a coaxial cable to a group of theaters which are to be served. Such cables also require repeaters and equalizers but are more specifically adapted to picture transmission. Both the cable and the telephone-line methods of syndication have the advantage of being strictly private which, from the theater viewpoint, is of course desirable.



J. R. SPRINGER—General Theatre Manager, Century Theatres, New York, N. Y.—says:

"RCA's Service has been excellent consistently. They are ready and willing to co-operate any time of day or night."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.

Another method which may well be quite economical is the use of highly directional or narrow radio beams to carry the program for syndication. If the beam is sufficiently narrow, is operated on a special frequency, and perhaps has some "secrecy" element in it, unauthorized pickup of the program may be avoided as a practical proposition. It would be odd if, in the new theater-tele art, we again encountered the old-fashioned motion picture "bicycling" of early days.

If radio syndication is used, as described, it will be necessary that the government allocate, through the F.C.C. the necessary channels to enable such operation.

Other physical problems will arise. Thus, some theaters might be shielded from the central transmission station and would then require an intermediate automatic radio-relay station located off to one side to avoid obstruction of the signal by the obstacle. Again, some theaters may find themselves in an "electrically noisy" location (that is, with much electrical interference with reception). If so, highly directional receiving antennas, shielding, or other expedients may prove necessary.

If radio syndication is used, a heavy-duty television receiver will be necessary in the theater to handle the picked-up program and to transfer it, by projection, to the screen. If wire or cable syndication is used, probably somewhat simpler receivers will be feasible.

[NOTE: The third and concluding installment of this series will deal with programming urban and national syndication, and future trends in theater tele. Appended will be a most interesting discussion incident to presentation of this paper.]

RCA's Ultra-Sensitive Microammeter

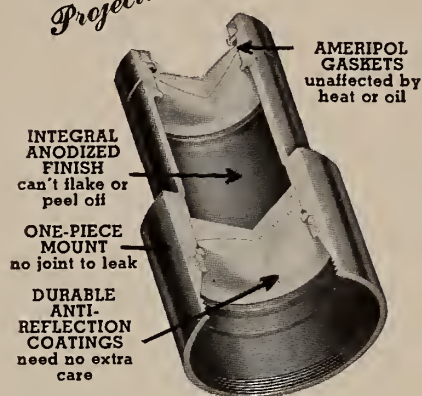
A new ultra-sensitive electronic microammeter, capable of accurately measuring d. c. currents down to one-billionth of an ampere, is offered by RCA Tube Division. The unit is a portable, battery-operated, vacuum-tube meter listed at \$100.

Current ranging from 0.001 microampere to 1000 microamperes, representing a range of 1,000,000 to 1, can be measured with this instrument, which has six range settings permitting a choice of the most convenient range. "Burnout-proof" design of the unit makes it capable of withstanding accidental overloads of 10,000% without damage to the meter movement.

New Phillips Carbon Savers

A new series of Safety Carbon Savers for Suprex and for low-intensity arc lamps has been developed by H. L. Phillips, a member of IA Local 500, Charleston, W. Va. Using the best heat-resisting steel, these Savers will not burn into the arc flame. Priced at the \$2 level, these Savers are obtainable from Phillips at P. O. Box 788, Charleston.

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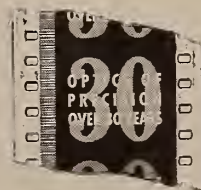
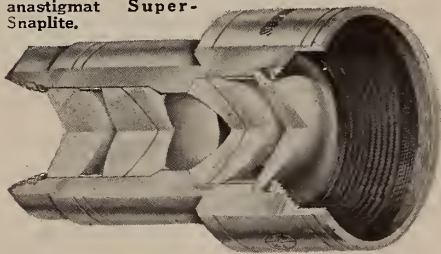
Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

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TROUBLE-FREE performance is assured by the hermetically sealed construction of Snaplite and Super-Snaplite lenses. They never need to be taken apart for cleaning—no dust or oil can enter! And their anodized finishes can't flake off!

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PROJECTION OPTICAL EFFICIENCY

(Continued from page 6)

film starts to move before the lens is closed) the ghost appears to extend upward from bright objects. To avoid confusion the following rule should be memorized,

Ghost DOWN, shutter EARLY;

Ghost UP, shutter LATE,

for the relation is stated the other way around in a widely used projection textbook.

If "travel ghost" appears on both the tops and bottoms of bright objects, it means that the shutter blades have been trimmed too narrow. The width of the blades is readily adjusted on many makes of projectors having disc-type rear shutters, but no such adjustment is provided on most machines employing double or cylindrical shutters.

In all cases the width of the blades should be as narrow as possible, and the width of the balancing blade must be precisely the same as that of the master blade to avoid violent flickering. Perforated or other "freak" blades should never be used.

Front shutters of the old type should be located at the point of aerial image, i.e., the point where the image of the lamp condensing lens or mirror is thrown upon

the shutter blades by the projection lens. In this position the blades may be narrowed for greater light transmission. It must be pointed out that backlash in the mechanism gear train, as well as the diameter of the light beam and speed of cutting, will limit the amount by which the blades may be trimmed.

The Projection Lens

Next in order for consideration is the "neck of the bottle" of the entire projection process, the objective lens. The principal terms used by projectionists for describing the performance of a lens are:

1. Optical Speed—Definition—Flatness of Field—Contrast Factor.

True, there are other factors to be considered: the sturdiness of construction, for example, and the resistance to heat, to oil seepage, etc. The matter of reflection-reducing coatings on the lens elements comes strictly under "optical speed," which, by the way, should be distinguished from "geometric speed." The latter is given by the f -number of the lens without regard to the losses of light by absorption and reflection.

The quality of the projection would be spectacularly improved in *more than half* the theatres in the United States by the simple expedient of replacing old-style projection lenses with those of modern

design. It seems almost unnecessary to point out that new lenses of good quality are readily available now. Several American companies, utilizing new anastigmatic optics, coated elements, hermetically sealed lens tubes, etc., are manufacturing lenses of unprecedented speed and superiority of performance.

The f -number of a projection lens should be as great as possible, by all means greater than the f -value of the lamp. It is very unfortunate that the subject of "matched optics" has given rise to all kinds of misconceptions. Were the aperture a mere point, maximum efficiency would indeed be obtained by matching the f -value of the lens with that of the lamp. But the aperture isn't a point; it is an area from which emerges a beam of light so large that the very "fastest" lenses are needed to intercept it.³ For this reason lenses "slower" than $f/1.9$ or $f/2$ should not be used in projectors having reflector arc lamps.

The true optical speeds of the highest-grade lenses are increased by coating the glass surfaces with very thin anti-reflection films. Light loss due to reflection in coated lenses is less than one-quarter the loss in untreated lenses. Moreover, the anti-reflection coatings act

³ "Uniform Screen Illumination as Related to High-Speed Lenses," John L. Maubetsch, IP for September, 1947, p. 5.



Perfection in Projection is Standard with Super Cinephor Lenses

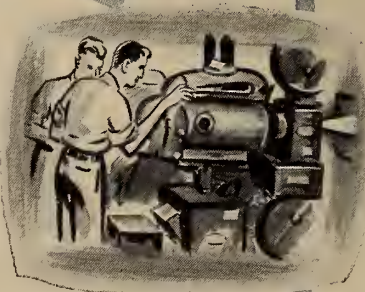
Successful theatre operators constantly seek perfection in projection. They know that profits are dependent on projecting sharp, uniformly brilliant screen images. That is why the overwhelming majority of new theatres shown in the current Theatre Catalog were equipped with Bausch & Lomb projection lenses. Perfection in projection will be the standard in your theatres, too, if you use Bausch & Lomb lenses. Bausch & Lomb Optical Co., 616-R St. Paul St., Rochester 2, N. Y.

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in conjunction with modern optical design to provide screen images of remarkably good contrast values. Excellent image definition, flatness of field, and satisfactory depth of focus are other features characterizing the new lenses.

Because projection lenses "wear out" only through misuse, it is worth while to give considerable thought to the matter of keeping them clean and in brand-new condition.

Maintenance of Optical Elements

The surface of the rear element which directly faces the aperture becomes soiled more quickly than any other surface. Not only does it get spattered by oily film, but the oil vaporized from the hot gate condenses upon it as a fog. Inasmuch as this surface requires more frequent cleaning than any other, it is especially liable to damage from rough treatment. The surface of the front element which faces the screen, exposed as it is to the open air, has a marked tendency to become dust-covered.

There is no reason why a lens should ever be marred by finger prints. Projectionists know better than to touch a clean lens surface with the fingers.

Dust may be removed without the necessity of taking the lens from the machine. A very light brushing with folded lens tissue or a clean, soft cotton cloth is usually sufficient. Oil spots pose a greater problem, but sometimes even these may be removed without disturbing the lens. Vigorous rubbing or scouring must be avoided.

At regular intervals, however, it is necessary to remove the lens from the projector for a thorough cleaning, espe-

cially when oil fog is easily noticeable.

Alcohol, ether, carbon tetrachloride, acetone, etc., are not recommended as lens cleaners. Aqua ammonia and strongly alkaline soap solutions are dangerous, as they may etch the glass. Jewelers' rouge, silver polish, or the so-called lens-polishing pastes should never be used for cleaning projection lenses. These are abrasives, and coated lenses, in particular, may be damaged by their use. Jewelers' rouge may "frost" a lens if used repeatedly, and there is always the danger that gritty particles may be present and inflict severe scratches. Here is the procedure:

1. Remove oil by gently washing off the lens surface with a soft cotton cloth moistened with the weak soap solution recommended by the lens manufacturer. Rinse off with pure water and wipe the surface dry with lens tissue or cotton cloth. Avoid hard rubbing. Never use silk or wool for cleaning lenses.

2. Remove dust by brushing the lens with clean, dry lens cloth. A clean camel-hair brush may also be used.

3. All finger marks are greasy. Use the method for removing oil spots or film.

4. If in doubt as to whether the lens should be cleaned, don't clean it.

Disassembly of Lenses

Old-style lenses should be taken apart for cleaning, as oil vapor slowly seeps inside the lens barrel and fogs the inner surfaces. The newer hermetically sealed lenses should never be disassembled. Any attempt to open the lens barrel will break the seal and permit the internal surfaces to become dirty.

In most types of lenses the rear element consists of two separate lenses cemented together with a resin called Canada balsam. In time this material discolors and interferes with the performance of the lens. When this happens the lens must be returned to its manufacturer for repair. The newer lenses employ special thermosetting resins which do not deteriorate like balsam under high heat conditions.

Remember that the projection of blank light to the screen for long periods of time may blister Canada balsam. Light tests made for the purpose of lining up the lamp or projector position should therefore be as brief as possible. A dirty or moisture-covered lens may absorb heat so rapidly that full light will crack it.

Projector Port Data

Whenever port glass is used it should be the very finest grade crown optical glass. The expense must not be considered, for an inferior glass will ruin the picture. Moreover, the glass must be tilted in its holder to correspond with the projection angle, for if the light does not pass through the port glass *squarely*,

internal reflections will interfere with picture definition.

From an optical point of view projector port glass is an evil. The writer has experimented with sound-absorbing baffles in an attempt to do away with glass in projector ports, but he has found repeatedly that projection room ventilating fans draw auditorium air with its inevitable dust over the lenses, thus quickly soiling them. In the average theatre, therefore, there seems to be no choice but to use glass in the ports.

The same care used in cleaning lenses should be accorded the port glasses.

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To get the benefits of RCA Service—write: RCA SERVICE COMPANY INC., Radio Corporation of America, Camden, New Jersey.

IN THE SPOTLIGHT

(Continued from page 19)

under whose auspices the demonstration was held, reports that the men displayed a lively interest in the equipment and that he was highly pleased with the reception accorded the showing.

The picture shown was National Carbon's "How Carbons are Made," and Lester Morris and H. H. Frasc, representing National Carbon, were kept on their toes answering the many questions fired at them.

- The official headquarters for the forthcoming 39th IA Convention will be at the Hollenden Hotel, Cleveland, Ohio. Convention sessions will be held in the Cleveland Auditorium the week beginning August 16.

- Nathan Storch, president for the past 20 years of Westchester County Stage Employees Local 366, was tendered a testimonial dinner and dance several weeks ago at the Hotel McAlpin, New York City. The party was highlighted by the presence of many prominent civic and industry leaders, officials from the General Office and from nearby Local Unions.

Solly Pernick, business agent for New

York Stage Employees Local 1, was the master of ceremonies and introduced many leading performers from Broadway shows who entertained the guests. Incidentally, the national anthem was beautifully rendered by Solly's 17-year-old daughter, Miss Lenore. Ed Sullivan, famous Broadway columnist, did a fine job as toastmaster.

A touching tribute to Storch's mother saw the entire assemblage arise and applaud as she was presented with a lovely bouquet of roses.

Joe Monaco, charter member of Local 366 and chairman of the arrangements committee, presented Storch on behalf of the Local with a U. S. Savings Bond. Later in the evening, President Dick Walsh presented columnist Sullivan with a gold honorary membership card in Local 366.

Among those present were Dick Walsh, Wm. P. (Perrin) Raoul, Jimmy Brennan, and Joe Basson, of the General Office; Matthew Levy, attorney for the IA; Supreme Court Justice Sydney A. Syme; Wm. Slater, chief of the Westchester Parkway Police; Morris Yule, commissioner of the Westchester Water Department; E. D. Hawkins, Westchester Recreation Center; Vincent Ehrbar, Westchester sheriff; James Grady and Mike Rosen, Loew's, Inc.; Joe Di Lor-



John W. Reed, secretary-treasurer of Local 792, Plymouth, Mass., taking a quick look-see through the pages of IP before showtime.

enzo, John Hearn, and Charles Ulrich, RKO; Judge Pat Sirignano; Harold Williams, Duwico, Inc.; John Miller, Hartford Local 84; Emil Smith and Fred Thome, Westchester Local 650; Tom Murtha, Brooklyn Local 4, and Morrie Seamon, New York Local 751.

- Those two grand old men, standbys of New York Local 306 and the 25-30 Club, Mike Berkowitz and Cecil R. Wood, Sr., celebrated their birthdays last month. We tried by devious ways and means to get these gentlemen to divulge their exact natal dates, but it was no go.

- Earl J. McCannel, secretary-treasurer of Local 510, Fargo, S. Dak., and a member of the 25-30 Club, was presented with a solid sterling key chain, the links spelling out his name with the IA emblem inlaid in gold. The presentation was made at the party given for Earl in honor of his 25th year as an officer of the Local.

- Tom Murtha, business agent of Brooklyn Local 4, was appointed head of the craft committee of the amusement industry in the 1948 United Jewish Appeal Campaign for Greater New York. Herman Gelber and Herman Boritz, New York Local 306, and Morrie Seamon and Jimmy Murphy, New York Local 751, will also serve on this committee.

- Although flying a plane is a far cry from running a projection machine, it is not a deterrent to the flying enthusiasm of Walter S. Croft, business agent of Local 170, Kansas City, Mo. Walter recently purchased his own plane and is spending much spare time perfecting his flying technique.

- General Theatre Supply Co., Ltd., of Canada, recently hosted over 100 members of the International Projectionists Society of Toronto at a luncheon-demon-

(Continued at foot of next page)

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PERSONNEL

J. A. MILLING has been named to the newly-appointed post of Commercial vice-president of RCA Service Co. Formerly manager of the Parts Division of the RCA Tube Dept., he will supervise merchandising, sales, advertising and promotional activities of the service organization.

Several personnel changes in the interests of greater flexibility of operation have been announced by Westrex Corp., export branch of Western Electric Co. W. E. WARN, newly appointed chief of engineering has arrived in New York from his recently relinquished post of managing director of W. E. in Australia. He was succeeded in the latter post by W. S. TOWER.

MARCEL G. PERSON from Venezuela to general manager of W. E. Mexico. JULIUS P. WINTER, formerly contract manager in Paris, is now v.-p. of W. E. Italy. Big war hero, this fellow, being a Knight of Legion of Honor, holder of the Croix de Lorraine and the Compagnon de la Resistance.

L. E. SWANSON is now manager of the East Central region of RCA Victor, headquartering in Cleveland. He succeeds H. V. SOMERVILLE, who has been named head of the sales and merchandising activities of RCA's Sound and Visual Products. Latter has been with RCA since 1928 and is well-known in sound equipment field.

NORMAN D. OLSON, SR., export manager for De Vry, left on April 21, via Pan American airlines for an all-flying trip through Ecuador, Peru, Chile, Argentine, Brazil, Venezuela, Dominica, Puerto Rico, Panama and Cuba. OLSON will exploit the new De Vry 31-pound Bantam 16-mm equipment, the "12,000" theatre system, and the new drive-in units.

(Continued from preceding page)

stration gathering. Tommy Hoad, member of the Society, demonstrated the operation and care of the Simplex E7 projector and of the Peerless Magnarc lamp, pointing out the many improvements and refinements embodied in these units. The Simplex 4-Star sound system was demonstrated by George Cuthbert.

- Ben Brown, former president of Cleveland Local 160 and an IA representative back in the days of Bill Canavan's regime, has retired from projection work and is devoting all his time to the operation of the Soissons Theatre in Connellsville, Penna., which he owns.

- A guaranteed annual wage agreement was successfully negotiated by the Upholsterers' International Union. The pact provides for a 44-hour week for 50 weeks per year, one week's vacation with pay plus a week's pay as a Christmas bonus. Wage rates are to be computed on the basis of an 8-hour day, 40-hour week,

with time and one-half for overtime. Other gains include 7 paid holidays and contribution by employers to the Union's health and death benefit insurance plan.

25 Years Ago—May 1923

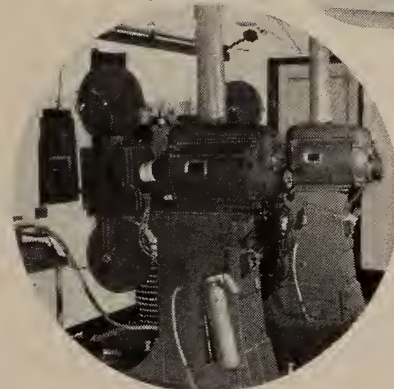
- Show business reported on the mend. Box office figures indicated a definite improvement over business for the previous season. . . . AF of L discussed the advisability of organizing its own political party. . . . President Gompers, AF of L, stressed the need for education. "Knowledge is one of the most potent sources of power in the world," declared Com-

pers in an address before the Workers' Education Bureau of America. "Knowledge breaks down all obstacles. Those who know the facts of history and the facts of our time are the ones best fitted to cope with the great problems that confront us." . . . R. E. (Rut) Morris, Local 519, Mobile, Ala., was elected secretary of the 7th District, succeeding Cliff Clower. . . . The 8th District Convention held in Indianapolis was voted one of the most successful meetings of its kind. International officers Charles C. Shay, F. G. Lemaster, and Wm. F. Canavan were among those in attendance.



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Study this sturdy projector pair pictured in the New Era Theatre's tidy booth. Then realize that whether you are a metropolitan exhibitor or a neighborhood operator, you can now afford *perfection in projection* with DEVRY's "12000 Series" theatre equipment.

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Indoors or Out



Only 5 Time Winner
of Army-Navy "E"
Award for Motion Picture
Sound Equipment

DEVRY

AMERICAN TRADE UNIONS

(Continued from page 22)

to indicate the expansion of craft interests contained within an international. In shipyards and gun factories members of the Machinists Union turn, bore and rifle the 16-inch guns for our battleships and coast defense guns weighing 150 tons; while in another industry they machine small parts which must be accurate to ten-thousandths of an inch.

In other shops machinists make the tools, jigs and dies without which modern metal manufacturing in many lines of production would be impossible. They make the small and also the ponderous machine tools which, when placed in other machine shops, will be operated by machinists.

The automobile mechanic is a machinist indispensable in garages; while in the railroad repair shops the machinist is one of the essential craftsmen.

What the Electrical Workers and the Machinists have done in developing progressive organization policies is equally true of all other craft unions whose problems of specialization were the result of modern industrial innovations and invention.

Apprentice Training Vital

The so-called craft unions of today have developed their policies because necessity impelled them, in the same manner and for the same reasons which have governed the growth of all human institutions, including that of our form of government here in the United States.

While these farsighted adjustments were being made, all of the crafts gave increasing attention to the thorough

training of apprentices, so that they would acquire a basic knowledge of their trades regardless of the division or divisions in which they might work.

It is these unions, more than any other

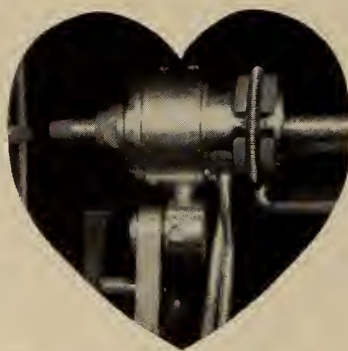
factor, which created a nationwide interest in apprenticeship in the 1920's. The cooperation of employers of skilled trades and the local boards of education was enlisted. In a number of larger cities an entire school building was devoted to this important feature of our public school system, while in other localities rooms were set aside for the craft education of the future mechanics.

In these classrooms the bona-fide apprentice was taught to acquire manual dexterity, but in particular he was instructed in the necessary theory which could not be so well imparted while the apprentice was actually working at his trade. In part, this was the craftsman's answer to industry's indifference to thorough apprentice training and to the average employer's practice of using apprentices as cheap labor, with no intention of having them learn the trade thoroughly.

[To Be Continued]

The Very Heart of Your Projection

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- The only scientifically designed and proven Electric Water Cooler.
- Cools carbon 1" from gap.
- Theatres using the Water Cooler report 20- to 40% gain in light.
- Current is supplied direct to Cooler, eliminating carbon resistance.

Ask your dealer for a demonstration in your theatre.

HUFF'S MANUFACTURING CO.
659 W. Jefferson Boulevard
Los Angeles, 7 California

HANDLING, STORING CINE FILM

(Continued from page 14)

work and special treatment to restore those films to usable condition.

Regular theatre nitrate film base does not absorb and release moisture to the extent that safety film does. Camphor vapor combines with the nitrate base and restores much of the film's original toughness. Unfortunately, camphor is not effective for restoring and preserving 16-mm film, for it is clean and cannot injure the film.

The worst feature of camphor is that it imparts its powerful aroma to the film, but many people do not mind this aroma. To me it has always seemed questionable whether water vapor exerts any shrinkage-preventing or "softening" effect upon nitrate film. Too much moisture certainly does harm the emulsion.


Camphor Restorative for 35-mm Film

Although treatment of film with camphor will probably not be of use in work with 16-mm film, here is a method for preventing brittleness and shrinkage in 35-mm nitrate prevue trailers:


First, shave a small block of camphor with a jackknife. Then place the shavings in a small bottle of acetone and shake them up until they are dissolved in the clear liquid. Finally pour a little of this solution in the cover of the film can and let the acetone solvent exaporate completely. This leaves a thin, tightly-adhering crust of tiny camphor crystals in the cover.

When the box is closed—and it must be closed tightly—the air inside becomes charged or saturated with camphor vapor. For best results with camphor the film box, cabinet, or storage vault should be left undisturbed for a week at least. This gives the film ample opportunity to take up the fumes. Humidification of safety film with water vapor, on the contrary, is beneficial even if the film is taken out for use every day.

Never overlook the danger of water coming in contact with the film.



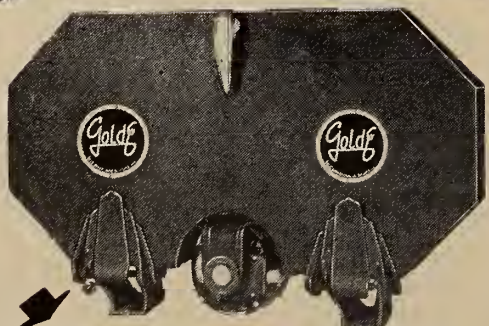
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Low Maintenance Cost
Positive Friction . . .
Will Not Clinch Film

Modern, Compact Design
"Tilt-back" Case . . .
Reels Can't Fly Off

Queen of Gems May Have Role in Electronic Art

A RADICALLY new method of controlling the flow and amplification of electric current—one that may have far-reaching influence on the future of electronics—was described recently before the American Physical Society by K. M. McKay of Bell Telephone Laboratories.

The method is based on the discovery that when beams of electrons are shot at certain insulators, in this case a diamond chip, electric currents are produced in the insulator which may be as much as 500 times as large as the current in the original electron beam.

There are indications that, if certain engineering problems can be overcome, the technique may lead to the development of important new electron tubes which do not exist today. For example, the technique might profitably be applied to the development of an entirely new means of obtaining extremely high amplification. It is not expected to replace existing electronic techniques but rather to supplement them.

Essentially, the research consisted of successfully causing an insulator—which by definition will not conduct electricity—to carry considerable amounts of it. Moreover, Dr. McKay has now succeeded in using such insulators, specifically diamond chips, to amplify electrical currents. Methods of amplifying currents in gas or vacuum tubes have been known since the development of the first practical high-vacuum tube approximately 35 years ago, but this has never been done previously in solids.

Procedure Data Anent Process

The process itself is somewhat similar to the technique of translating the energy of a beam of light into electricity, which underlies the operation of the well-known photo-electric cell.

Inducing electric currents in diamonds by bombarding them with relatively light-weight electrons proved to be considerably more difficult. The physicists found that as the current started to flow in the diamond chip, the electrons became trapped in the tiny imperfections present in all crystals. Thus, after the first fraction of a second, the induced current tended to waste away under

the opposition of the trapped electrons.

To overcome this, the investigators applied an alternating voltage to the diamond chip so that alternately negative and positive charges were drawn through the crystal and some of each kind were trapped. The trapped positive charges cancelled out the effect of the trapped electrons, or negative charges, and the induced current flowed freely.

The diamond crystals used in the experiment are small chips or even so-called "saw-cuts" obtained from a natural diamond in shaping it for gem stones. They may be $\frac{1}{4}$ inch square and approximately 20/1000ths inch thick, roughly the size of a snowflake. Most of those used gave good results, although some did not respond at all.

Before the crystals are ready for use, gold is evaporated onto the two flat surfaces of the chip in films less than 1/100,000th inch thick to afford electrical connections.

In bombarding the diamond chips with electrons, the physicists used successive pulses of electrons lasting only a millionth of a second rather than a steady stream of electrons. Energies of approximately 15,000 electron volts were employed.

One of the most important features of this new technique is that the induced currents are produced within exceedingly short times. In fact, the time required is so brief that thus far it has not been possible to measure it. The investigators are certain, however, that it is *less than one ten-millionth of a second*.



Jack Kirsch

president, Allied Theatres of Illinois, Inc., says:

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"It is easy for me to explain why I consider Altec Service a friend of our business. The Altec engineer's entire career is concentrated on preserving our equipment and getting the full value out of it, and keeping our replacement costs and our operating costs at a minimum. The Altec research men, furthermore, are always analyzing the technical weaknesses which cause break-

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THE SERVICE ORGANIZATION OF THE MOTION PICTURE INDUSTRY

Kodak's \$92 Million Quarterly Sales

Eastman Kodak's sales for the first quarter of 1948 totaled \$92 million, an increase of about 29% over the same period of 1947. Both total sales and earnings this year are expected to be "somewhat higher than in 1947." Only about 8% of the total sales increase this year is attributable to price increases, the balance being due to a larger volume of sales.

Wenzel 35-mm Export to Streuber

Exclusive export distributorship of the Wenzel 35-mm professional theatre projector has been given to K. Streuber & La Chicotte, 1819 Broadway, N. Y. City. Acquisition of a mechanism will enable this export house to offer a rounded service to all foreign clients, all other lines having been filled previously.

CLAYTON BALL-BEARING EVEN TENSION TAKE-UPS

For all projectors and sound equipments

All take-ups wind film on 2, 4 and 5 inch hub reels.

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For perfect rewinding on 2000-foot reels.

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SMPE PAPERS ABSTRACTS

(Continued from page 11)

illuminated by light of a certain color and simultaneously see the true colors of the objects themselves. This is one of the most basic types of vision, yet it cannot be predicted from the simple physics of the light or the known properties of the eye.

The presentation is popular and non-technical and is illustrated by more than 100 colored slides.

PROJECTIONISTS'
\$300 **SERVICE**
MANUAL

U. S. NAVY PHOTOGRAPHY IN THE ANT- ARCTIC DURING RECENT 'HIGHJUMP' OPERATION

By Lt. Charles C. Shirley
Bureau of Aeronautics, U. S. Navy

The Navy's Operation "Highjump," 1946-47, had as its primary purpose the training of personnel, testing of equipment, and improvement of operational techniques in sub-zero temperatures. Every phase of the operation and the performance of equipment undergoing tests were photographed in 35-mm black-and-white and 16-mm color motion pictures.

The many difficulties inherent in photographic operations in sub-zero temperatures and polar regions require special technique. These and the malfunctions of cameras and suggestions for improvements are treated.

The Navy is developing cameras more suitable for use in frigid areas. Research is being conducted for a less brittle plastic for film bases than is now available for cold-weather photography.

The presence of more light on the surface of the south polar ice cap on overcast days than on bright, clear, cloudless days seriously effect photographic exposure. This phenomenon confounds a photographer until he becomes aware of it, as he is accustomed to giving more exposure on overcast days instead of less. The abundance of light in the Antarctic necessitates modification of exposure meters.

FLICKER IN MOTION PICTURES

By L. D. Grignon

20th Century-Fox Film Corporation

Flicker is defined for the general case and additional information on subjective effects and analysis is presented. The subject is then restricted to those types of flicker which are the result of equipment deficiencies, and quantitative methods for measuring such effects are described. The application of testing methods to specific equipment, the results obtained, and certain remedial measures are discussed. Finally, recommendations for future work in this field are submitted.

MAGNETIC CUEING OF CINE FILM

By James A. Larsen

Academy Films, Hollywood

This magnetic cueing device was designed to eliminate the necessity of cutting "notches" in the edges of motion picture originals used in film printers. Principal objections to the cutting of notches are (1) difficulty of removing the notches if the cueing must be changed (2) possible damage to the film at the weakened notch section, and (3) possibility of sideways motion of the film when the notched frames pass the printing aperture.

It is believed that it will be possible to make more duplicates from an original which has not been notched and that film wear will be reduced by the elimination of the notches.

The method of magnetic cueing consists of painting a small dot of magnetic material on the edge of the film between two perforation holes. Chemically-reduced powdered iron mixed in a binder of very quick drying lacquer such as fingernail polish is used for the paint. This paint may be placed on either the emulsion or base side of the film and still be detected by the low-impedance (50-ohm) magnetic detector.

Low-impedance transmission to the electronic amplifier, where multiple alloy input transformer shielding is used, insures the good signal-to-noise ratio necessary for dependable operation. A high-gain amplifier, followed by a noise clipper, feeds the actuating pulse to a heavily biased single-shot multivibrator with a rapid recovery time. The multivibrator directly operates a control relay for a standard time interval.

The equipment as designed contains two independent cueing channels, one for controlling printer light changes and the other for controlling a fade-in or fade-out device

Just Published FILMS IN BUSINESS AND INDUSTRY

By HENRY CLAY GIPSON


\$4.00 per copy

HERE is a detailed and non-technical manual for business executives, sales managers, personnel managers, and others concerned with the application of visual aids to the problems of industry. The book is a practical guide to modern practices in the use of the non-theatrical motion picture and slidefilm. Fully illustrated, and containing numerous case histories, the book discusses the various ways in which visual aids can be profitably applied to your individual business needs—training personnel, advertising products, promoting safety campaigns, etc.

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harmony of color tone and
picture brilliance.

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which is built-in on some printers. A mounting for two extremely small pickup heads has been designed to allow direct replacement of existing notch actuator switches in film printers.

PRINCIPLES AND PRACTICES OF THREE-COLOR SUBTRACTIVE PHOTOGRAPHY

By W. T. Hanson, Jr. & F. Richey
Eastman Kodak Company

The color vision characteristics of the eye are discussed and the rules which are followed are used to show the requirements for the "perfect" additive and subtractive, three-color photographic process.

Since these requirements are not achieved in practice, a theoretical study of a practical color process may not always give an adequate analysis of its usefulness. However, such an analysis may point out some of the pitfalls which occur in practice. For example, many subjects may appear the same color to the normal eye and yet give different results when photographed. Also, any given color may be reproduced incorrectly by any process in use.

The effects on picture quality of changes in contrast, balance, and a variety of other variables are shown. The restrictions which some of these factors place on the use of color films are mentioned. The dye characteristics which cause quality loss in duplicates are discussed and the various compromises which must be made in obtaining adequate quality duplicates are reviewed.

16-MM FILM FOR TELEVISION PROGRAMS

By John A. Maurer

J. A. Maurer, Inc., Long Island City, N. Y.

Much of the 16-mm film that has been available for television broadcast purposes has fallen far short of the technical quality that is possible when the best presently available commercial techniques are used. This paper discusses the quality possibilities and limitations of 16-mm cinematography and sound recording to show that it is readily possible to achieve quality in both picture and sound which should be adequate for the needs of television broadcast for a long time in the future.

FILM STANDARDS, DIMENSIONS, AND BEHAVIOR

By A. C. Robertson

Eastman Kodak Company

This paper deals with certain aspects of the problem of improving 16-mm projection quality. The accuracy of slitting and perforating 16-mm film would have to be considerably better than that of 35-mm film if the same picture steadiness is to be obtained. The required accuracy is of the same order of magnitude as the best that can be obtained commercially. Variations from the nominal dimensions always occur and follow a typical probability curve.

Although practically all commercial film is slit and perforated to within the recognized tolerances, shrinkage of film with time or changes in dimensions due to changes in humidity means that film as used is often outside of the original specifications. This rarely introduces difficulties because the

industry has recognized these effects. It has, in fact, utilized the shrinkage of the negative on the continuous printer.

As potential shrinkage is reduced the long-time shrinkage effects are improved, but difficulty is introduced in making quick release prints. The possibility of new standards for slitting and perforating is considered.

PRESENT STATE OF THEATRE LOUDSPEAKER DESIGN, PERFORMANCE, MEASUREMENT

By John K. Hilliard

Altec Lansing Corporation

This paper reviews the technical advances in many fields contributing to the improvement of loudspeakers and suggests factors

that must be considered in determining the power rating of a system.

A discussion is given on the correlation between objective and subjective tests of loudspeaker characteristics. A description of the measurements made for the Motion Picture Research Council is outlined. Data on the various types of measurements is illustrated for a typical system. These measurements include sound pressure levels for various angles with respect to the axis of the system, response at three widely separated power inputs, harmonic and intermodulation distortion tests, and data on energy distribution as measured from the ASTR3 Theatre Sound Test Reel.



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Use FILM-WELD to patch ALL types and makes of film—8-mm, 16-mm, 35-mm, Trucolor, Technicolor, Kodachrome, Nitrate and Safety Film.

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Projectionists favorites also are ZIPPER CHANGEOVERS to guarantee continuous performance; Strong Universal Rewind Mules, the fool-proof "mule" that fits any enclosed rewind; and Strong Reel-End Signals.

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MRS. L. R. ROBERTSON—Owner, Lucas Theatre, Dallas, and Pix Theatre, Fort Worth, Texas—says:

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MONTHLY CHAT

(Continued from page 3)

the broadcast networks' flat refusal heretofore to cooperate in developing theatre television, Raibourn said that the FCC refused to assign wave-lengths for such purposes because no theatres were actively pursuing such a project. The SMPE has also failed in its effort to have channels allocated exclusively for theatre television.

Most interesting are the cost figures for this type of theatre television. Exclusive of the regular theatre visual and sound equipment used in the last stage of the process, there is required a television receiver, a sound recording unit, film processing equipment, and last but by no means least the camera itself. Competent estimates place the cost of this extra equipment at about \$18,000, although group production of from 20 to 25 complete equipments at a time would probably shave these costs by about 25%. Even this lower price would be a sizable cash outlay for any theatre outside the de luxe classification.

Nothing stemming out of this Paramount enterprise serves to alter radically the opinion generally held in authoritative quarters anent the feasibility of theatre television. Here was an instance where precise programming was done long in advance of the showing, which is no trick at all. Just how many amateur bouts and attractions of that type can be run into a theatre before the audience tires of the novelty of the presentation? This leads directly to the weighty matter of programming.

Raibourn airily states that there is a sufficiency of program material (not all happening at the precise moment suitable for ready interpolation into a regular film show) and he cites the numerous sporting events constantly going on, in particular prize fights.

As to the latter, Raibourn forgets the legal headache centering on an individual's right of personal privacy (this includes spectators) and even Madison Square Garden has recently been forced to cut in all boxers for 25% of any monies received from the sale of television rights. And plenty of other legal barriers remain to be hurdled, not the least of which involves copyrights for which royalty payments are asked.

The Paramount stunt has demonstrated merely that a theatre, given the right kind of expensive equipment, sufficient time to adjust its program, clearance on copyright and the individual's right of privacy, the *right kind* of entertainment—given all these things plus a few other assorted knick knacks, a theatre will be able to show a delayed newsreel (it was a film show, after all) of a current event. Television receivers capable of projecting large-screen images, of course, would bypass the film recording and developing process, but there still would remain the major problem of interpolating spot stuff into a regular theatre program. Regu-

larly scheduled sporting events and other usable program fare will require quite a bundle of dough from a large number of theatres to overcome the kitty that will be set up by large national advertisers for the rights to send the images into the home.

As the situation now shapes up, the motion picture theatre field has neither the transmitting facilities nor the right kind of program material available to alter the present film exhibition setup. Nor does it seem likely that the FCC, the video networks, the large national advertisers, or the sports promoters will exhibit much interest in theatre television until such time as a formidable chain of tele-equipped houses exist.

On other fronts television is booming along at a terrific pace, and to this corner it still represents box-office poison.

Polacolor Prints to Be Made Available to All Companies

A cartoon film now in circulation among theatres ("The Circus Comes to Clown"—Paramount) is the first motion picture to employ the new process for printing color film developed in the laboratories of the Polaroid Corp., Cambridge, Mass. Known as Polacolor, this process produces three separate color images on a single layer of standard black-and-white film from three color separation negatives.

Use of standard film and essentially the same processing equipment employed in the production of black-and-white movies makes the Polacolor process rela-

tively inexpensive, plus the fact that it may be run in all standard projectors. The process provides stable pictures with good definition, sharpness and resolving power. It provides a high degree of color control, permitting faithful reproduction of the original scene.

Employs Conventional Devices

Printing of the three color images is effected by conventional devices. All the film materials, chemicals and processing agents required for the process are commercially available. The Polacolor silver sound track is exposed and developed along conventional lines and has the same characteristics as conventional sound tracks.

One complete unit capable of producing three to four million feet of Polacolor annually is now operating, and additional production units are planned. While Paramount has the inside track on Polacolor at present, methods for making the process available to the film industry in general are under discussion.

RCA Program Schedule Blanks

Printed program time schedule blanks in handy pad form, for use by theatre managers, projectionists, and in the box office are now obtainable free from RCA servicemen and dealers. The schedules, in pads of 100, are printed in two colors, with ruled spaces for the insertion of data. Two columns are provided for data on volume-control settings together with the titles of films, name of exchange, running times, starting time, and a box for special instructions.

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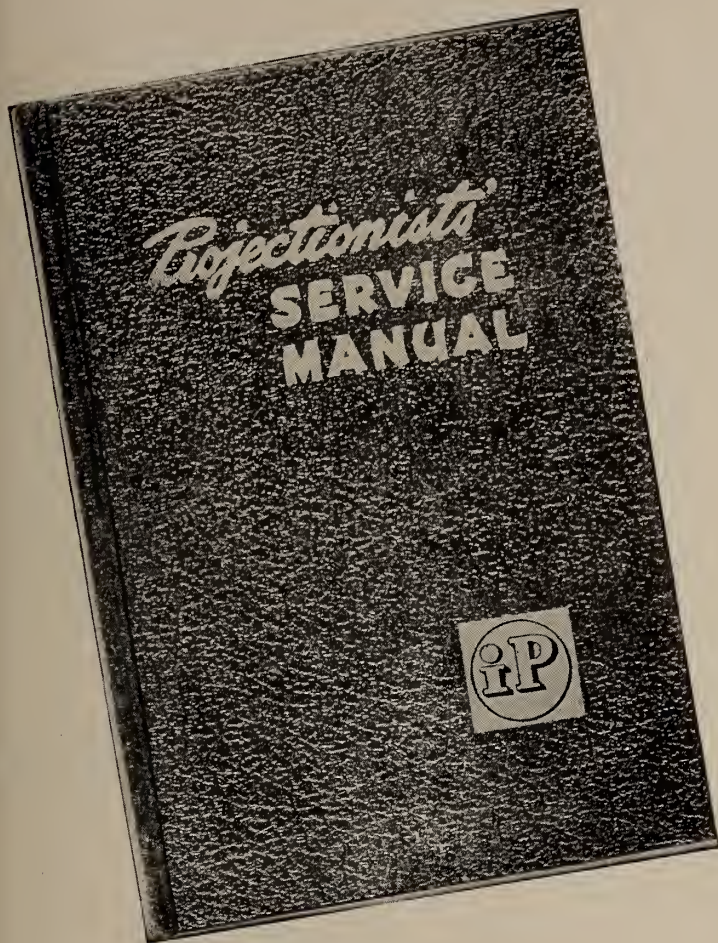
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Every projectionist should know the whys and wherefores of his projection room equipment. He should know what to do and what not to do when his equipment fails to function properly, and how to keep the show going until the service inspector arrives at the theatre. PROJECTIONISTS' SERVICE MANUAL is a

complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only \$3 per copy, postage prepaid.

Send for it Now!

Do Not Delay

INTERNATIONAL PROJECTIONIST

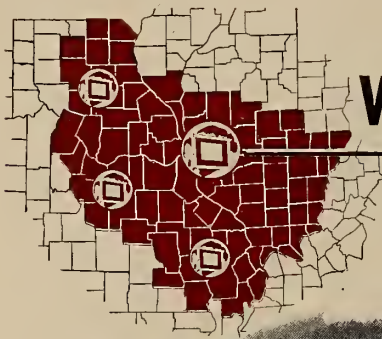
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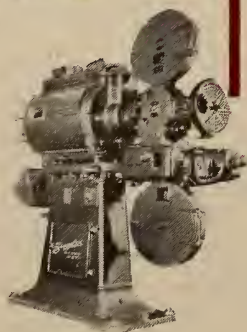
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INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING



HENRY B. SELLWOOD, *Editor*

Volume 23

JUNE 1948

Number 6

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MONTHLY CHAT

IT WOULD seem that the well-advertised economy wave which washed over the motion picture industry late last year has not yet expended its force. Of course, the dollar-paring knife left no marks on executives' office suites ("How will I live on \$100,000 annually?") but was wielded expertly in the lower echelons, particularly in the distributing end of the business.

Indicative of the continuing trend is the fussing and fuming about damaged prints that is going on between the exchanges and the theatres around the country. Exchanges assert that film damage is increasing sharply and that it is all done in theatre projection rooms. Theatres reply that the film arrives in poor shape.

It's extremely difficult to assess responsibility for film damage. Whether it be a shortage of prints as a carryover from the war years (which IP believes is a major factor) or inefficient inspection in the exchanges, or rough handling in transit, or worn projector equipment, or careless work in the projection room—the answer poses a tough nut to crack.

One thing is certain, however: right in the middle of all this furor is the projectionist. Today the projectionist is spending much more time in an attempt to repair defective film (that is, after he finally wrenches the reels out of the shipping cases) and he is also constantly being devilled by the exhibitor about bills for film mutilation received from exchanges. This is Mr. Projectionist's rap only if he wants to take it—because he needn't.

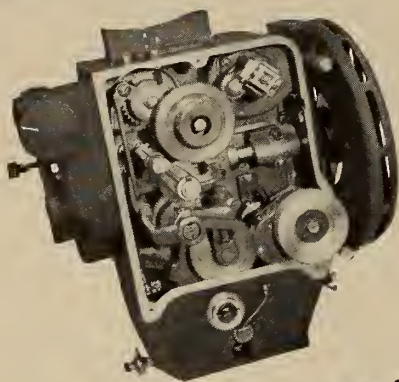
Without indulging in any of that "I told you so" stuff, IP directs attention again to a sure-fire means for protecting the projectionist and repassing the buck to both exhibitors and exchanges. Every projection room should have a pad of report forms, in duplicate, on which would be entered, after careful inspection, the *exact* condition of every foot of film comprising a given show. This form should bear on its face a printed disclaimer of responsibility for any untoward happening stemming from the unsatisfactory condition of the film described thereon.

One copy of the completed form would be retained by the projectionist; the other would go to the theatre management. This procedure would prevent buck-passing, at least to the projection room, and, by putting the exchanges strictly on their own, might effect a general overall improvement in print conditions.

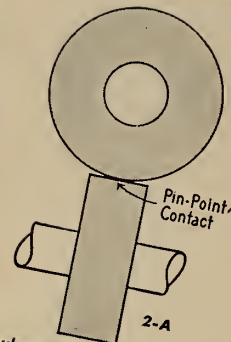
Those units of the organized craft which have adopted this plan report that they have not only rid themselves of the interminable bickering anent film damage but have actually enlisted management support in the from of stiff representations to the exchanges on the score of damaged, often unplayable, film.

Brenkert GEAR TRAIN PROVIDES

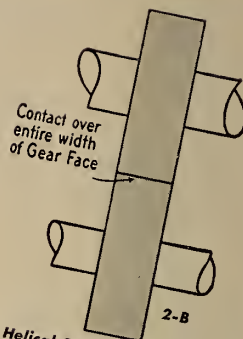
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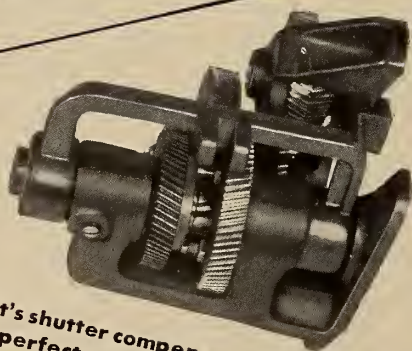


Angular-Driven Spiral Gears used in some projectors



Helical Gearing on Parallel Shafts used by Brenkert

Helical gearing on parallel shafts—lasts longer! It allows meshing teeth to contact each other over the full width of the gear face. See figure 2-B. Minimum backlash and maximum contact-area result in smooth, quiet operation and negligible wear over a long period of time. Angular-driven gears, figure 2-A, allow only pin-point contact between meshing teeth of mating gears—result in rapid wear, noisy operation, inferior projection.



Brenkert's shutter compensator gear assembly assures perfect picture definition and high efficiency of light transmission to the screen! It makes possible the framing of the film at the picture aperture by swiveling the intermittent while at the same time maintaining perfect timing between the shutters and the intermittent. In terms of high-quality performance, this gearing insures original smooth performance and maximum operating efficiency throughout the life of the projector.



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For complete descriptive literature on Brenkert Projectors, write: Theatre Equipment Section, Dept. 47-F, RCA, Camden, N.J.



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New Acetate Film for Release Prints

By DR. CHARLES R. FORDYCE

Research Laboratories, Eastman Kodak Company

Here is an authoritative and candid appraisal of the characteristics of a vastly improved acetate motion picture film preparations for the mass production of which are now underway by Eastman. This article was written especially for IP in recognition of its exclusive transmission of all pertinent data anent this new release print development to the industry.†

SAFETY film has been used for amateur motion pictures, particularly in 16-mm and 8-mm widths, since the inception of home movies about 1923. The cellulose acetate safety base of that time eliminated the fire hazard that goes with cellulose nitrate, the base of professional motion picture films.

Inferior physical qualities of the earlier safety base film prevented its extensive use in the professional field. It had comparatively low wearing quality, excessive tendency to swell when wet and to become brittle when dry, and low rigidity which resulted in poor steadiness in projection. These made the use of nitrate base film necessary, despite the added limitations and precautions required.

Wartime Acetate Unsatisfactory

Improvement in the quality of safety film came in 1937 when Eastman Kodak Company changed from cellulose acetate to cellulose acetate propionate for the material used in base manufacture. This presented advantages over the former product in many respects. It was less

subject to brittleness at low humidities and more resistant to dimensional change by moisture under varying conditions.

During the war years of 1941 to 1945 this safety film was very satisfactory for many purposes, including limited theatre use for short subjects. For professional motion picture use, however, this product still fell somewhat short of the necessary wearing qualities and rigidity to meet the required standards. For these reasons still further improvements, particularly in strength and rigidity of the base, were desirable.

In the manufacture of the previously used types of safety support the cellulose was completely acetylated. Then some of these acetyl groups were hydrolyzed off to provide a material suitably soluble in the necessary solvents to cast into film base and to provide solubility for splicing. To gain this advantage in solubility, the product was transformed from a strong, rigid, very heat-resistant acetate to one more plastic.

It has now been found that by carrying the hydrolysis step only a fraction of the amount which had been employed heretofore, the inherently good physical prop-

erties of the cellulose triacetate could in a large part be retained and yet produce a material soluble in special solvents from which the base could be cast and for which solvents could likewise be employed in film cements for splicing.

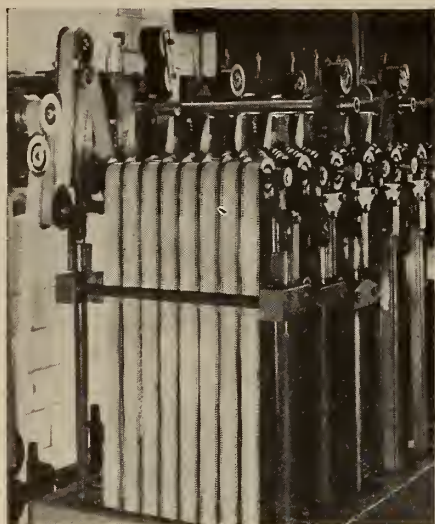
Early in 1946 Eastman began replacing the acetate propionate safety film support with the new improved high acetyl acetate type. In addition to the adoption of this product for many safety films, considerable experimental work has been done on testing its suitability as a replacement of cellulose nitrate in those fields in which the latter has predominated for so many years.

Tensile Strength, Rigidity, Flexibility

Laboratory tests carefully conducted over a considerable period of time have indicated that the tensile strength, rigidity, and flexibility of the high acetyl acetate safety base much more nearly approach those of nitrate than those of the earlier safety bases. Some properties of the high acetyl acetate base, such as tear strength, were found to be somewhat lower than those of nitrate. It was found, though, that all of the physical properties of the safety base are permanent with time, whereas the nitrate film, though initially superior in some respects, often suffers a loss with time.

In the matter of freedom from change in dimensions with time, the high acetyl acetate safety base surpasses the other mentioned types, including the nitrate. Certain film defects have long been associated with slight shrinkage of the edges of motion picture film during use. One such defect is known as "buckle" and

† "Acetate Stock to Supplant Nitrate," by Henry B. Sellwood; IP for June 1947, p. 5.



35-mm processing machine at Kodak Park

often gives rise to in-and-out of focus of images on the screen. The exceedingly low rate of shrinkage of the new safety base indicates that film on this stock should be substantially free from "buckle."

The new safety base shows a greater resistance to the effect of moisture and humidity than the acetate propionate safety base or the old acetate safety base, and, in fact, approaches the values of cellulose nitrate in this respect. The low resistance to water of the early acetone soluble acetate base frequently gave rise to troubles in processing, often resulting in film distortion. The acetate propionate type was an improvement in this respect but was still considerably less resistant than nitrate film. Extensive laboratory tests and large-scale trade processing tests have shown the new base to be satisfactory in this respect.

Projection Quality Factors

The projection quality of the high acetyl acetate safety film has been tested both in the laboratory and in theatres. Exhaustive wearing tests in the laboratory under carefully controlled conditions indicate that the new safety film is a distinct improvement over the acetate propionate type, but still slightly inferior to the best nitrate. This is due in part to the slight difference in physical properties, which has been mentioned, and in part to the lower shrinkage values of the safety film as compared with the nitrate.

It should be recalled that the presently used intermittent sprockets on projectors give best mechanical wearing results with films which have undergone a shrinkage of as much as 1%. The lower shrinkage of the high acetyl acetate safety film, therefore, is a disadvantage in this respect. As the new standard 0.943" diameter intermittent sprockets gradually replace the existing intermittent sprockets, this disadvantage of low shrinkage will disappear and the wearing

property of the high acetyl acetate safety film will exceed by a considerable extent the wearing quality of the present nitrate on the present 0.935" intermittent sprocket.*

The projection quality of the new type of safety film has been found to equal that of nitrate film in screen steadiness and appearance. At moderate amperages, such as from 50 to 70, no difference could be detected between any of the film types—the previously used acetate propionate, the high acetyl, or the nitrate. At arc intensities of 175 amperes, however, the superior performance of the higher acetyl type over the acetate propionate is marked. After projection at high arc intensities the high acetyl acetate film showed less frame and image embossing than the nitrate.

In addition to experimental tests, the new film has been carefully watched through limited commercial trade use (theatres) for which special prints of several feature pictures were circulated through film exchanges in different parts of the country. In these tests, for which alternate reels of safety and nitrate film were used in each print, satisfactory quality was obtained in every respect.

Mention has been made of the fact that ease of solubility in a large number of organic solvents was sacrificed in order to preserve the inherently good properties of the high acetyl acetate base. Thus, the splicing of the new safety film required special attention. Entirely new cements had to be manufactured and distributed.

Many old types of safety film cement and previously used nitrate cements *will not* make satisfactory splices with the new base. Fortunately, the new cements,

* "A Standard 0.943 Intermittent Sprocket," by Henry B. Sellwood; IP for May 1947, p. 5.

used for the new base, make satisfactory splices with the older types of safety films *and with nitrate*. One may therefore use the *new safety cement* for *all* films, or one may continue to use nitrate film cements for those films known to be on nitrate stock.

Occasional splicing troubles arise in the use of either nitrate or safety films in which weak bonding of the film is obtained. At such times it should be emphasized that the mechanical scraping of the emulsion surface preparatory to splicing is equally as important as the cement employed. It is necessary not only that the emulsion layer be completely removed but also the very thin bonding, or sub-layer, as well.

The perfectly scraped film will appear rough and dull—not smooth and shiny. It is essential that the scraper blade be sharp! The blade should be changed whenever it fails to scrape cleanly with light pressure. With heavy usage it may be necessary to change the blade daily.

Summary of Characteristics

Summing up the over-all results obtained from both laboratory tests and experience in the field, the new Eastman safety film may be characterized as follows:

1. Low shrinkage will keep the film free from "buckle" and the resulting in-and-out of focus images on the motion picture screen.
2. Tensile strength, rigidity, and flexibility are more like nitrate film than earlier safety films.
3. Greater resistance to effects of moisture and humidity means less processing trouble as well as less film distortion.
4. Projection quality, which is better than earlier safety films, is equal to nitrate film in screen steadiness and appearance.

Projection Factors of New Acetate Film

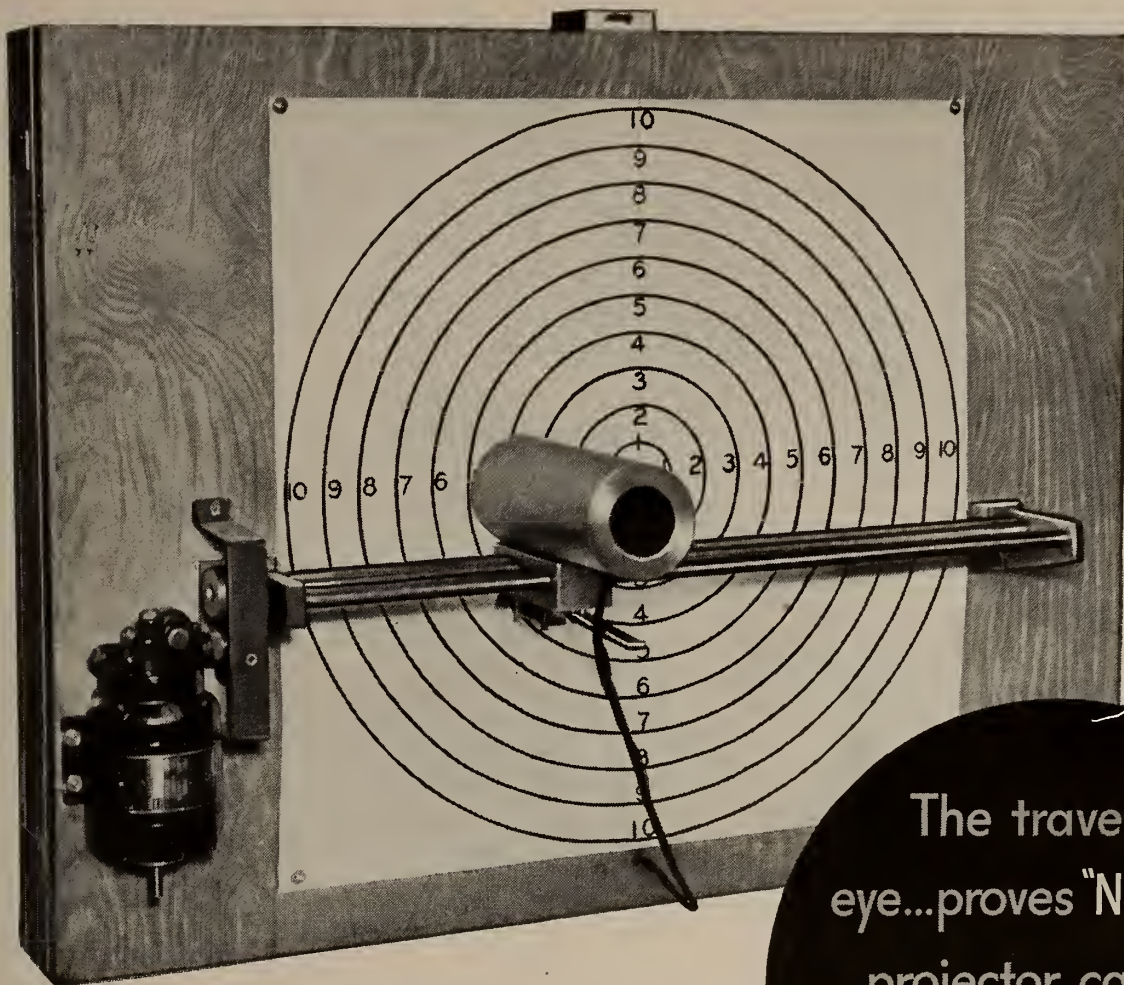
THREE factors of prime importance to the projectionist are emphasized in the accompanying candid description of Eastman's new acetate film by Dr. Charles R. Fordyce. These are: the new film's greater resistance to buckling as compared with the present nitrate stock, the reliance placed on the new standard 0.943-inch sprocket to compensate for the improved shrinkage characteristics of the new stock, and, on the debit side, the apparently well-founded opinion among projectionists generally that the new film does not match nitrate stock in tear strength.

Another non-technical aspect of the situation is that the new film will cost more than does nitrate stock, the full import of which fact is not revealed in terms

of the fraction of a cent increased cost per foot of original release prints. For if the new film proves more susceptible to tearing than nitrate stock, then the print-replacement cost item may have considerable bearing on the degree of acceptance won by the new film among distributors and projectionists.

Tearing Strength Controls Life

Much is made of the fact that the new film is more resistant to normal wear than is nitrate stock; but IP regards this as a relatively minor factor in the commercial handling of theatre film. All prints, irrespective of type, will wear out through repeated use and will exhibit a tendency to tear at the corners of the sprocket perforations. Once the perforations begin



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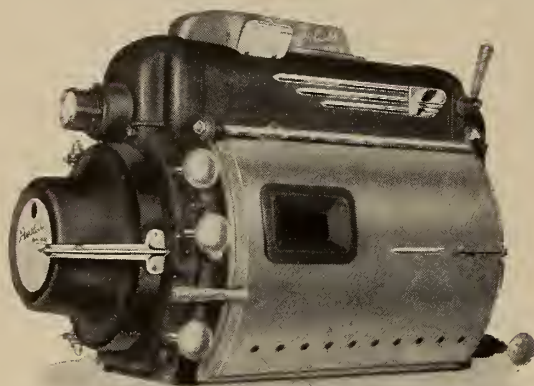
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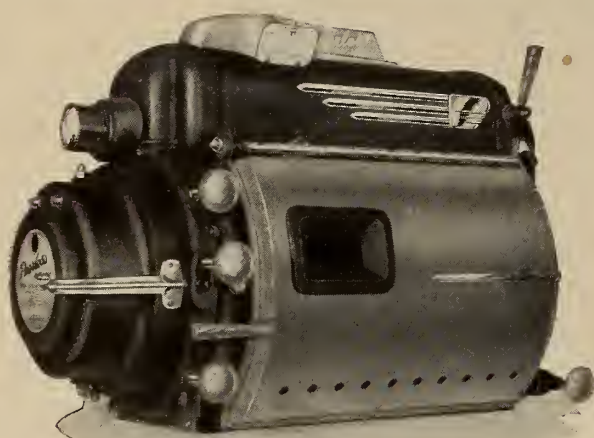
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to tear, the life of a given print is very short.

This is an economic factor which may be assayed only after many acetate prints are in circulation and cost figures are compared with a similar number of runs for a nitrate print.

Unquestionably Eastman subjected this acetate stock to exhaustive laboratory and simulated theatre projection room tests before embarking on the large-scale production program now underway. Also, several special acetate prints have been spotted around the country and carefully observed for the duration of their runs. In one instance—the M-G-M feature “If Winter Comes”—the entire release print order utilized acetate stock.

Test runs serve a very useful purpose, but it is one thing to spot a feature in a first-run theatre for six weeks where equipment and technique probably hit a pretty high level, and quite another thing to run the same print in the subsequent runs which are handicapped by insufficient manpower and inferior equipment.

It would be most interesting, therefore, and of great practical value to this whole acetate film project, to have reports from projectionists in subsequent runs which have projected “If Winter Comes.” Reports on facility in splicing and on tearing strength of the film would be especially welcome.

Importance of 0.943 Sprocket

The shrinkage characteristic of the new safety film, less than 1%, poses a problem on those projectors which have not yet changed over to the new 0.943 standard intermittent sprocket. Fortunately, it will be some months before there will be any appreciable amount of the new film in general circulation, and it is hoped that the changeover of sprockets will be accomplished within that time period by practically all motion picture theatres.

All major projector manufacturers are in accord that the new oversized sprocket is desirable. Motiograph is already using the larger sprocket on all its AA model projectors and reports “excellent results” in the field. Karl Brenkert is inclined toward the view that the 0.943 dimension is a bit too much and it is likely that he will finally settle for a 0.940 sprocket for his projectors. Century Projector Co. reports the absence of the old projectionist objection to the larger sprocket on the ground that it was “too noisy.” Century attributes this acute noise-consciousness of projectionists in the past to the “tearing” sound occasioned by shrunk, brittle film leaving the sprocket.

Voluminous test work by a special SMPE committee, by Eastman and by projector manufacturers themselves proved beyond doubt that wear on the larger 0.943 sprocket is predominantly at

Psychology of the Sound Film

By L. MERCER FRANCISCO

Francisco Films, Chicago, Illinois

The sound film is particularly effective for influencing people in groups, bringing to bear factors in social as well as individual psychology. These factors include the physical conditions under which the films are shown, the absorption of the audience in the continuity (almost to the point of hypnosis), and a strong appeal to the emotions through self-identification. This paper is a very important contribution to the literature of the art.

I.

SIGNS of the times indicate that the engineer is beginning to show some concern over the social implications of his inventions and to feel some responsibility for them. Dr. Lee de Forest recently registered a vigorous protest against the abuses which his great invention, radio, has suffered at the hands of its commercial exploiters.

The first note made of the misuse of the engineer's talents was recorded by Thorstein Veblen twenty-six years ago in a trenchant little book, *The Engineers and the Price System*. Few engineers seemed to have paid any attention to it, however, until 1946, when John Mills, of the Bell Telephone Laboratories, published *The Engineer in Society*. How many engineers have read Mills' provocative book remains to be seen.

† J. Soc. Mot. Pict. Eng., Sept. 1947.

the base and that it is slight and not sharply defined. There is no evidence of a “hook.” The wear on the old standard 0.935 sprocket, however, shows that the film cuts deep grooves into the face of the teeth. The striking thing about these grooves is that they vary in depth and in the distance from the base of each of four teeth.

The increased extent of wear on the 0.935 sprocket as compared to the oversized sprocket is explainable. In the case of the former, the additional force necessary to thrust the film ahead of the rotational speed of the sprocket manifests itself in increased wear of both film and sprocket teeth.

Excessive Gate Tension Noted

When the pitches of film and sprocket are equal, the driving force is spread over two, or even three, teeth simultaneously, resulting in decreased wear on both film and sprocket. This condition should hold true even when the two pitches are nearly equal, as a result of the local stretching of the film upon impact. Fortunately, therefore, the use of larger intermittent sprockets enable sub-

stantially increased film life with no increase in sprocket wear.

The motion picture engineer has apparently shown no more concern over the uses to which his products have been put than other technologists, in spite of the fact that the motion picture has been more severely criticized for the ill effects it has had upon our culture and mores than any other invention. Whole volumes of criticism have been published and research foundations have devoted their energies to studying the baneful influence of motion pictures upon attitudes, social life, and behavior patterns.

Non-Entertainment Films

To date, the motion picture has been used almost entirely as an entertainment device, for that is where the “big money” has lain. Within the past decade, however, the application of the filmic medium to other ends of communication—education, instruction, and propaganda, in its

(Continued on page 24)

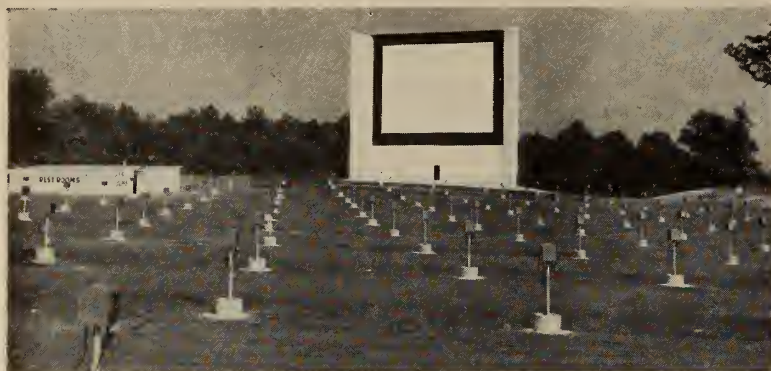
stantially increased film life with no increase in sprocket wear.

Projectionists will have to watch carefully the gate tension when running this new acetate film. The tension in the film gate is a vitally important factor in the life of any print. Tests indicate that the number of film passages varies from about 300 with a tension of 30 ounces to more than 3000 at 8 ounces, and the latter was not run to anywhere near breakdown.

In the projector on which the aforementioned tests were run it was noted that there was no difference in steadiness of the image with tensions greater than about 4 ounces; but below this point there was definite unsteadiness. A survey of a number of theatre projectors showed gate tensions ranging from about 20 ounces to about 10 ounces. These two extremes in tension produce a five-fold change in the wear-life of film!

Projectionists must watch that gate tension!

Don't forget those field reports on the projection characteristics of this new acetate film, particularly with respect to tearing strength and splicing facility.



Typical drive-in theatre screen tower. Note ramp construction permitting patrons of each car a clear view of the screen. Motiograph in-car speaker shelters are equipped with individual lights to illuminate each speaker standard.

Projection Requisites for Drive-In Theatres

BY THE ENGINEERING DIVISION OF MOTIOGRAPH, INC.

THE marked success of drive-in theatres, exceeding the fondest hopes of even their most optimistic proponents, insures that they are now a permanent part of the motion picture exhibition field. It seems eminently desirable, therefore, that projectionists have a broad understanding of the visual and sound reproducing equipment used in these installations.

One of the most important considerations is the structure and location of the screen tower. It is desirable to have the tower face north or northeast so as to lengthen available show time as much as possible.

The screen tower might well be built in a triangular shape so that one side will face the traffic coming from one direction while another side faces the opposing traffic. This permits the placement of large well-lighted signs, thus allowing the name of the theatre to be seen for a considerable distance in two directions.

Recommended Picture Size

The minimum picture size recommended is 30 feet high by 40 feet wide which would be satisfactory for up to 10 ramps. The width of the screen should be increased about 5 feet for each additional ramp constructed, though the maximum width should not exceed 55 feet if a reasonably well-lighted screen image is to be obtained. (The picture height is approximately three quarters of the picture width.)

In order to give each patron a clear view of the screen, it is necessary to have the bottom of the screen from 16 to 25 feet above ground level so that patrons in cars on one ramp may see over the cars in the ramp ahead.

The screen itself should preferably be constructed of large flat weather-proof panels painted with a flat white paint. While joints and seams are not too notice-

able when a picture is projected, a better picture will result if the joints of the panels are sealed.

To obtain maximum light reflection into the parking area, and to eliminate "keystone effects," it has been recommended that the face of the screen be tilted forward into the parking area, so that a perpendicular line from the screen center would terminate approximately two-thirds the depth of the theatre from the screen face. Results to date from following this procedure fail to justify the relatively large increase in screen building costs the tilted arrangement involves.

A shadow-box has proved to be helpful in preventing extraneous light from shining on the screen. It is questionable, however, if the benefits gained warrant the extra construction expense.

The screen building should preferably be of structural steel construction, though cement block construction, reinforced with steel bars, has been used to good advantage in many instances. The screen tower must, however, be constructed to withstand maximum wind velocity in the area in which it is to be erected, and to determine this point, the services of a competent engineer or architect are of great importance.

Lenses, Length of Throw

The most efficient projection lenses currently available are the high-speed, anti-reflection-coated types, and such lenses are recommended to the exclusion of all other types. Even in these excellent lenses, however, there is considerable variance in the degree of efficiency and amount of distortion offered in their varied focal lengths.

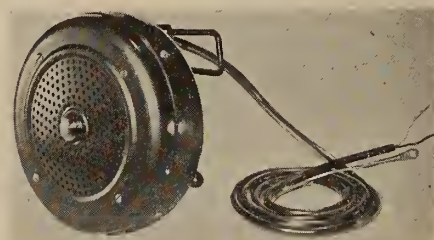
Experience has shown that the best over-all performance is given by 4 to 4½" lenses, with 4¾ and 5" lenses being slightly less efficient. The use of lenses of these focal lengths automatically re-

quires that the drive-in theatre projection building be located at least 200 feet from the screen if a large picture is to be obtained.

The exact distance from screen to projection building is dependent upon the size of the picture desired and the necessity of using lenses in the 4 to 4½" range. To obtain the correct throw (the linear distance from the screen center to the lens center) one should multiply the picture width by the size of the lens and then divide the result by 0.825. [EXAMPLE: With a picture width of 40 feet desired and with a 4¼" lens to be used, the formula is 40 times 4¼ divided by 0.825, or 206 feet.) The distance on the ground from screen to projection building will be slightly less than the length of throw.]

The location of the projection building 200 to 250 feet from the screen (third or fourth ramp) causes the loss of some of the most favorable car positions. Of course, cars may not be placed in the path of light from the projectors, and the view from ramp positions in the first few ramps to the rear is obstructed by the projection building.

Some drive-in theatres desiring to use these excellent car positions have located their projection building 100 to 125 feet from the screen despite the fact that picture results are not as favorable



Motiograph SE-7530 In-car speaker unit with cord, steel cable, and plastic covering.



She remembers Mama...

NOTHING here betrays the days that passed between the camera's visits to this room. To movie-goers, all seems the same as when they looked in "only a moment ago."

Because—before the camera rolled—the script girl had every single detail in mind—from the actors' make-up, costumes, action, down to the smallest prop. And thus the director's "second

memory" made sure that smooth continuity would be faithfully preserved.

Through such unflagging watchfulness, the script girl adds much to every picture's perfection . . . saves many a costly retake, too. In this, of course, she's not alone—her "silent partners" are films of great dependability and uniformly high quality—members of the famous Eastman family.

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due to the approximate 10% lesser efficiency of the shorter focal length lenses. If these less efficient short focal lenses are acceptable, projection buildings can be located closer to the screen than the currently recommended 200- to 250-foot distances.

It is to be noted that if a 120-foot distance is to be used, the maximum screen width would be about 49 feet, so if a larger picture is desired, the projection building must be located further back from the screen.

The projection room should follow the same plans as those of an indoor theatre with respect to location of the projection equipment. It is important that the building be as low in height as possible so that an absolute maximum of car locations behind the building may be utilized. It has been recommended that part of the building be located below ground, but actual practice has shown that the loss caused by water seepage is considerably greater than any extra revenue that might be obtained from the gain of a few car positions. It is important that the foundations and lower walls of the projection building be fully sealed against moisture.

In addition to the projection room proper, space should be provided in the projection building for a power equipment room and men's and women's washrooms. These rooms must be adequate in size, but it should be borne in mind that the larger the building, the more the loss of favorable car positions on adjacent ramps.

Sound System Most Important

Experience has indicated that the sound system is the most important single item of drive-in equipment to be selected. The drive-in exhibitor not only has to consider the quality of his sound system's reproduction but his customer's preference as to type of speaker equipment and even the nearness of his neighbors.

Early drive-ins were equipped with

sound systems employing loudspeaker systems as used in very large indoor theatres, or with individual speakers located upon posts between each two cars. Today, very few of the older drive-ins and an even lesser number of the newer ones are employing these methods of sound reproduction because of the possibilities of their neighbors obtaining in-junctions restraining their use.

It has been previously stated that the drive-in theatre to be successful must be located near a center of population and thus there are bound to be some adjacent neighbors. While the considerably lower cost of sound systems employing central loudspeaker systems or post-mounted individual speakers favors their use, it is unwise to install such systems because of the probability of having the drive-in closed as a public nuisance.

In-Car Speakers Preferred

In-car speakers are preferred by drive-in theatre patrons as the sound volume may be regulated to suit the patrons' particular desires and the sound can be heard with the car windows closed in wet or stormy weather.

It is true that there has been a great deal of disappointment in the sound results from in-car speakers in many installations, this having largely occurred from the use of poor quality speaker units of insufficient size to efficiently reproduce acceptable sound. That is why Motiograph recommends the use of high-quality speaker units not smaller than the standard 5" type.

While in-car speakers should be selected on the basis of sound quality with some consideration being given to their size and appearance, it is also very important that longevity of components, accessibility for repair and generally good mechanical design be considered, since the speakers are subject to extremely rough handling by patrons. They also should be weather-proofed to the maximum extent consistent with rea-

sonable first cost to reduce annual maintenance costs.

In-car speakers are connected to a junction box by three different types of connection cords. The most popular and cheapest is a regular rubber-covered cable; another is the coiled cord (usually costing about \$2 more per speaker). A third type consists of a regular rubber-covered cable with a companion steel cable, both of which are covered with a waterproof casing. This latter type is considerably more costly than either of the other two.

Experience has shown that some in-car speaker and junction box damage and some automobile damage results from the use of the so-called regular cords which hang down to catch on bumpers and door handles. This can be eliminated by purchase of in-car speakers utilizing the coiled cord, the extra initial cost being a desirable investment.

Loss of in-car speakers by theft can largely be prevented by the use of the steel cable type of connection cord. While this method saves losses from theft, the possible damage to speakers, junction boxes and automobiles resulting from patrons driving off without removing speakers from car windows or doors, more than offsets the losses which might arise from theft.

Junction Box Requisites

Each two in-car speakers require a junction box in which is located an impedance-matching transformer. A very careful check of this unit should be made before purchase, as much operational difficulty can be avoided if a well-designed unit with good components is selected. These are the requirements for a good junction box:

1. It must be as weather-proof as it is possible to make it.
2. It must be strong.
3. Terminal blocks must be supplied for the speaker and feed cables.
4. Impedance-matching transformers shall be of highest quality. (Check to see that they are fully impregnated against the effects of moisture.)
5. Speaker hooks must be well designed to permit the patron to quickly replace the speakers on the junction box.
6. Electrical circuits should be arranged to prevent accidental short-circuits in speaker connection cables from affecting other junction boxes on the same ramp feed circuit.
7. The junction box should be designed to allow easy and rapid servicing and the mounting facilities should permit the boxes to be readily removed for inside storage at the close of the drive-in season.
8. Speaker support hooks should be an integral part of the box so that it will not be necessary to drop speakers on the ground to inspect connections and do other testing.
9. The junction box should present a good appearance since it is in full view of the patrons.

The sound system must have power am-

(Continued on page 28)



Projection room in Skyway Drive-In Theatre at Buechel, Ky. Complete equipment furnished by Falls City Theatre Equipment Co. includes Motiograph projectors and sound system, Strong lamps and rectifiers, and Motiograph in-car speakers.

Projection in the Far East

By H. CAMPBELL BROMLEY
Technical Section
Royal Air Force Cinema Corporation

This summary of practices in the Straits Settlements, another in IP's series anent projection around the world, will occasion many lifted eyebrows among the craft here in the U. S. A., particularly on the score of general procedure, equipment used and, of all things, working conditions.

DURING recent years the people of Singapore and Malaya have become increasingly "movie-minded" and there are now many theatres to cater to them. The population here consists principally of Malaya, Chinese and Indians, but every town of any size has a European community. The great majority of cinemas, therefore, screen a mixture of films in the English and Asiatic languages. However, there are quite a number of cinemas which show Asiatic films exclusively.

Many of the more modern theatres are fine buildings and compare very favorably with their Western counterparts. Quite a number of them have restaurants attached, complete with liquor license, and one or two have elevators fitted to carry patrons to the upper floors. The great problem here is that of cooling the theatre, and all the modern cinemas are equipped with air-conditioning apparatus.

Strict Regulations Enforced

Operating methods of theatres here differ quite a lot from American and British practices. There are no regular "change days"—if the film is good it will run until it stops taking money; while if it is poor, it will be replaced after a couple of days.

Also, the continuous or "repeater" program is quite unknown here. A regulation which exists in most parts of this country provides that the theatre must be closed to the public for 20 minutes

between performances for cleaning and ventilating. Apart from maintaining a high standard of hygiene, which is most important in a tropical country, this scheme also enables the patron to reserve his seat in advance and thus view the program undisturbed.

The theatres operate under strict regulations which are very similar to those applying in Great Britain. These regulations lay down very definite rules for the projectionist's health and safety. Adequate working space, efficient ventilation and direct access to the fresh air, a separate rewind room (also with access to the open air), a special room set aside for switchgear, and a comprehensive kit of fire-fighting apparatus are some of the things required before a license to open the theatre is granted.

In addition, the projectionist must not leave a projector while it is running, so there must always be at least two men on duty. From this it will be seen that the one-man crew is quite unknown here. The average crew consists of two qualified men and a trainee, but some of the larger theatres, which run four or five shows a day, will have up to five projectionists.

Projectionists in the Straits Settlements do not have to hold a license but qualify for higher positions after working in a junior capacity for some time. Projectionists' wages vary according to the number of performances and can be anywhere between S. S. \$120 and 300 per month (approximately U. S. \$60 and 150).

In view of the very high cost of living these wages are not too high by any means. For comparison it should be noted that the ordinary craftsman such as a carpenter, mechanic or electrician can earn between S. S. \$200 and 300

H. Campbell
Bromley, RAF



per month. Projectionists are recruited mainly from the Chinese, Malay and Indian races, and it is quite usual to find men from all these races working happily together.

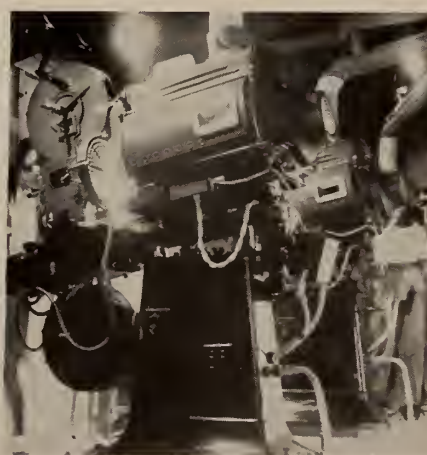
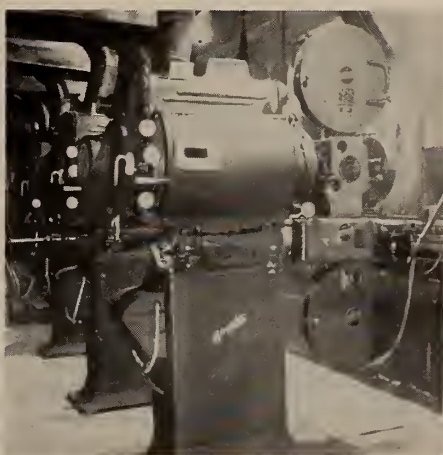
Union Amalgamation Needed

There is no separate trade union for projectionists here, but each town of any size has a union catering for workers in the amusement industry in general, and to which the projectionist can belong if he wishes. Obviously, until these small unions can amalgamate into one large national union very little can be done for their members. However, it must be realized that trade unionism is of comparatively recent growth out here and is undergoing its "teething trouble."

The equipment used here is practically 100% American. There are, however, a few Australian outfits here and also some pre-war German equipments. Simplex projectors, with Peerless or Brenkert arcs and RCA or Westrex sound, are easily the most popular with both exhibitor and projectionist. The Suprex type of arc with a metal or tungar rectifier is the most generally used light source, although there are quite a number of theatres using a-c arcs.

Effect projectors and elaborate spotlights are not often found here, although almost every theatre is fitted with a slide projector of some sort. Picture change-

SAME THE WORLD OVER: TYPICAL PROJECTION ROOMS IN THE STRAITS SETTLEMENTS



Capitol Theatre, Singapore (left): Simplex E-7 projectors and sound equipment, Peerless lamps, Brenkert effect projector, Rect-O-Lite rectifiers. The largest in Singapore, this theatre was opened in 1929, was extensively damaged by sabotage during Jap occupation. Note "surface wiring" mentioned in accompanying article. The Rex Cinema, Singapore (right): Super Simplex projectors, RCA sound, Peerless lamps and tungar rectifiers. Opened in January 1947.

over devices are seldom seen here as most projectionists prefer to do their machine changes entirely by hand. Similarly, motor-driven rewinds are not popular here as the projectionist likes to examine each reel of film after it has been through the projector.

It may be of interest to note that since the liberation of this country from the Japanese, a number of British-made equipments have been installed here. However, it is too early yet to say how this apparatus will be generally received by the trade.

Climate Affects Equipment

In a country such as this with a year-round average temperature of 87° F. and with a humidity of over 80%, delicate and intricate apparatus such as projection equipment is bound to suffer from climatic conditions. However, despite the climate, the apparatus gives excellent results, which is certainly a credit to the makers and also to the local maintenance men.

Electric cables deteriorate rapidly here and because of this they seldom are run in tubes but are cleated down to wooden battens. By adopting this method of wiring it is considered that the added danger of condensation in the tubing is avoided and the easy replacement of defective wiring is assured. It must be admitted, however, that this method of "surface wiring" makes a projection room look rather untidy, but, under the circumstances, it is very practical.

Regarding the actual film program, the projectionists of Singapore and Malaya are not nearly so fortunate as their American brothers. The exchange system does not operate here and all films arrive at the theatre in unspooled reels of approximately 1000 feet. Each reel is contained in a separate metal box and the complete feature is put into a wood-lined metal case for transit.

The projectionist is responsible for examining and repairing the film before it is projected and this work he does while running the separate reels onto the theatre's own spools. With the present shortage of film stock, each copy of a film is kept in circulation as long as possible, so, by the time it reaches some of the third-run theatres its condition can well be imagined.

Projectionists' Status Good

It is not unusual for a projectionist to have to spend up to three or four hours repairing the films before the show. Film mutilation as regards changeover cues is another big problem here. In fact, this form of film damage seems to be international, as it is a problem in every country visited by the writer.

In summing up the foregoing notes it will be seen that, with the exception of film handling, projection conditions here

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, American Federation of Labor

XV. Secession of Units and Formation of the C.I.O.

THE constructive policies of the international unions of the A. F. of L. in no way modified the steady attacks of those who desired to see industrial unionism more widely and more firmly established. The internationals and the Federation itself were under constant vitriolic criticism and gross misrepresentation. The general charge was that they were intensely selfish and indifferent to the welfare of the less skilled workers.

As proof, it was contended that the unsatisfactory degree of organization among these groups was evidence that the Federation did not have any sincere intention of giving its assistance to those who most required it. The fact that expenditures to organize this type of labor far exceeded the amount devoted to organizing the more highly skilled was ignored.

Equally ignored was the well-known fact that the majority of craft internationals preferred to do their own organizing through their specially trained organizers, while looking to the A. F. of L. itself to give its attention chiefly to organization of the semi-skilled and the unskilled.

Unorganized Mainly Unskilled

Many of these workers had been organized, but their number was less than was necessary. It was much more difficult to develop these workers into strong, permanent, soundly-administered organizations. Having no highly-trained skill, they moved from one industry to another as work offered itself. The craft organizations were disturbed by this lack of well-developed organization.

The rapid development of mass production, with the increase in the number of semi-skilled employed, was a constant menace to the crafts. In times of strike the semi-skilled could be and often were trained to do more skilled work. Particularly in the manufacturing industries as a whole, the crafts found themselves a smaller and smaller proportion of the total number employed.

Most valid reasons of self-protection

compare quite favorably with many Western countries. Regarding the projectionist himself, it may be said that, although as yet he does not enjoy quite the same status as his Western brothers, he is not too badly placed. He is not called upon to supervise the maintenance of the electrical and mechanical plant in the theatres, which is part of a projectionist's

prompted the crafts actively to assist in organizing the lesser-skilled. But this type of labor had not been organized in sufficient number, due in part to their attitude toward unionism, but principally because of employers' positive opposition.

To a large degree the lesser-skilled felt their handicap, for when discriminated against by employers they found themselves without adequate protection. They were without strong, active militant and experienced unions of their own.

Their welfare and the problem they presented had received much consideration in the activities of the A. F. of L. Constantly the lesser-skilled were organized. But painfully many were seen to falter and lose the ground they had gained because their organizations lacked the internal strength to withstand the continual and well-organized opposition of the employers.

In particular, the new mass production industries—such as automobiles, aircraft, and rubber—presented urgent problems. Each of these industries employed some highly skilled craftsmen, but the large majority of employees were not in that category. The men at the head of these industries were openly and fiercely opposed to the existence of any trade unions in their plants. Any worker who dared to speak up for trade unionism was immediately discharged.

A. F. of L.'s Mass Organizing Effort

Under these conditions the crafts found it most difficult to protect their members adequately. The internationals of craftsmen realized that the solution of their problem lay in the organizing of all the employees into their respective crafts or groups, and then federating these groups into plant and industry federations.

In 1926 the Metal Trades Department of the A. F. of L. decided to pool all of its affiliated strength to organize the automobile industry. This determination was presented to the convention. Unanimously

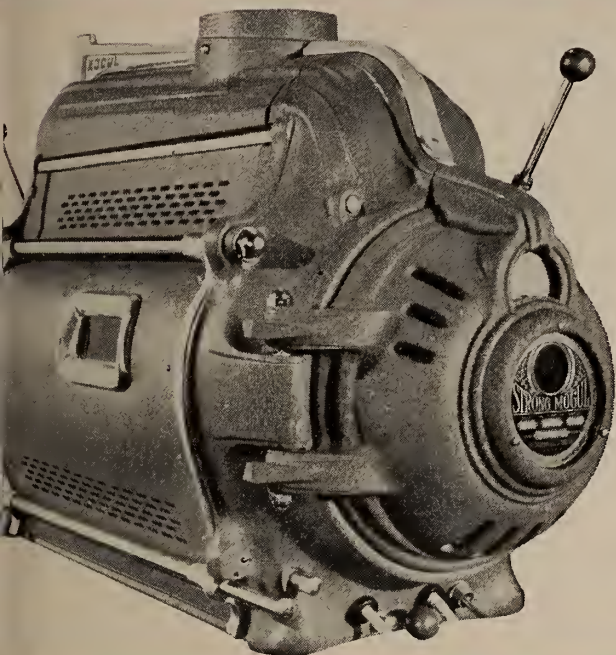
(Continued on page 25)

job in some countries, and, as most of the theatres here operate only in the evenings, he works comparatively short hours.

Finally, although he does not yet have a strong union to help him improve his craft and foster his welfare, his working conditions are good when viewed in comparison with the broad masses of other workers in this part of the world.

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IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE ever-widening gap between industrial corporate profits and the wages paid to the workers who produce that which rolls up such profits is graphically and candidly set forth in figures published in the financial section of *The New York Times* for May 16 last. This compilation reveals that in 1947 some 823 companies in 71 different fields registered a 51% profit rise over the net for 1946!

Nor does the term "net profit" tell the whole story, because swollen inventories at year's end represent goods paid for by money which would otherwise have boosted the reported net.

These two short paragraphs tell the whole story; that's all there is to it. Except to add that the item exposes in its true colors the action of Ford and the steel industry in declining wage increases for fear of "encouraging further inflation," and the shallowness of certain household appliance companies which announced price cuts—on items constituting 1/10th of 1% of their product line!

Prices at the corner grocery store, at the clothier's and all along the line, however, edge upward almost weekly. Food

Floyd H. Billingsley (right), business manager for San Francisco Local 162 and 3rd IA vice-president, congratulates H. J. "Dutch" Benham, Brenkert factory representative, for the instructive and impressive demonstration of the De-Luxe Brenkert BX-80 and the new Brenkert BX-60 projectors given for a group of over 100 IA projectionists from the Bay Area.



prices alone advanced 3% for the month of May!

• More than 300 persons attended the testimonial dinner given last month by Local 329, Scranton, Penna., in honor of IA President Walsh. Delegations from the Philadelphia, Camden, Harrisburg, York, Sunbury, Stroudsburg, Lebanon, Shamokin, Hazelton, Williamsport, Pottsville and Wilkes-Barre Local Unions were present.

Speakers of the evening, in addition to Walsh, were Frank C. Walker, chairman of the board for Comerford Theatres and former U. S. Postmaster General; Con McCole, former mayor of Wilkes-Barre, and Mayor James T. Hanlon of Scranton.

Donald Ball, chairman of the Local 329 arrangements committee, presented President Walsh with a wristwatch. Walker was made an honorary member of the Local. Acting on behalf of the Local, Walsh presented pocket watches to each of the five charter members—Thomas Davis, Harry Stevens, Harry Granville, Joseph Wynn and John DePeep (the latter is president of the Local).

• For many years the Will Rogers Memorial Hospital at Saranac Lake, N. Y., cared for many of our brothers who were in need of medical treatment and hospitalization but were financially unable to pay for such services. This organization now finds itself in dire financial straits, and we believe it would be but fitting that those Locals whose members at some time or other were cared for there, contribute as generously as possible to the hospital fund. Contributions may be sent to the hospital direct or to Harold Rodner, director of personnel for Warner Bros., who is also executive vice-president of the Will Rogers Hospital Fund.

Incidentally, Rodner, an honorary member of the 25-30 Club, was presented with the Beacon Award for Meritorious Service at the recent annual dinner of the Motion Picture Associates.

• We enjoyed a visit with Bob Connelly, member of Chicago Local 110, who spent several days in New York last month

while on an automobile trip through this part of the country. Bob spent some time at the DuMont television station (WABD), exchanging ideas with the projectionist on the job.

John Martin, business agent, and Joseph Kaplan, of Bridgeport Local 277, were accompanied by their wives when they visited New York several weeks ago. When we talked with them they were about to make a tour of the restaurants in our Chinatown to satisfy their yen for Chinese delicacies. We hope they had their fill.

• The recent death of Thad Barrows, Boston Local 182, leaves but four remaining charter members of the Local—James F. Burke, Nathaniel Max, Joseph L. Sheehan, and Barney McGaffigan. Thad's post as delegate to the forthcoming IA Convention will be filled by Leon Adam Narbut, duly elected alternate.

• The failure of top labor leaders to utilize mass media of communication, and particularly films, was deplored by Mark Starr, educational director of the International Ladies Garment Workers Union, at a recent conference of the New York Film Council. Labor unions need primarily two kinds of film today, said Mr. Starr:

One concerned with internal problems of trade unionism, the training of union leaders, union history, and the training

Projection, stage and studio representatives join forces at the recent party given by Local 366, Westchester Co., N. Y.: left to right, IP's Harry Sherman; Emil Smith (rear), president, Projectionists' Local 650, Westchester Co.; Solly Pernick, business agent, Stage Hands Local 1, New York City, and Herb Aller, secretary-business agent, Cameramen's Local 659, Hollywood, Calif.



of the new members in the union's program; the other, to tell the union's story to the general public. Labor's inertia in using mass media of communication, and especially films, was noted by all speakers at the meeting.

- Each year we make a number of business trips throughout the country and a considerable part of our time is spent in visiting IA Locals. Last month, on one of our periodic business trips through the Midwest, we stopped off in Chicago for a few days and, at the invitation of Gene Atkinson, business manager of Chicago Local 110, we attended the regular monthly meeting. Despite a driving rainstorm, more than 400 out of a total membership of 685 appeared at the meeting hall, each man giving his undivided attention to the business of the day.

When we heard the business manager read his monthly report to the membership, outlining the progress made by the Local in the preceding month, we readily understood why Local 110 has earned the reputation as being one of the most outstanding and progressive Locals in the IA. Here the members were given actual facts and figures on business transacted by Atkinson for the previous month. To recite a few of his accomplishments as reported at the meeting:

1. In a single month he placed 139 men on 16-mm jobs, earning a total of \$2,668.75; 8 men were placed on special 35-mm jobs, for a total earning of \$370.

2. Collected \$894 for the projectionists employed at one of the top-ranking houses when the exhibitor decided to close the theatre without giving the projectionists two weeks notice, as stipulated in the contract. The money collected represented two weeks salary for each man.

3. Signed contracts with drive-in theatres calling for two-man shift, \$3.93 per hour per man, starting at 5:30 p. m., irrespective of show time.

4. Out of a total of 183 theatres that were delinquent in installing sanitary facilities, there remain only 5 theatres that have not yet fully complied with the sanitary code. They are expected to fall in line very shortly.

5. Television stations WBKB and WGN: 3 projectionists on 6-hour shifts were placed in each station, 36-hour work week, at \$3.75 per hour per man. (Two more tele stations are expected to open before the end of the year, which will mean the employment of 6 more projectionists.)

6. Local 110 men are employed at the race tracks. Each man receives \$110 per week on a 6-day week basis.

7. When the feature picture "King Henry V" played a return engagement at a theatre at increased box office prices, 3 extra men at \$3.93 per hour for each man were put to work at the theatre. Total salary for the extra men for the week—\$452.65.

Also present at this meeting were Glen Kalkhoff and Oscar Trampe, president

and business manager, respectively, of Milwaukee Local 164; and William Oake and Frank Gorey, president and business manager, respectively, of Chicago Local 2. We all agreed that the record of Gene Atkinson as business manager of Chicago Local 110 speaks for itself and serves as an example of real Union leadership.

- James Leverone, member of Bridgeport Local 277, was struck by an automobile several weeks ago while on his way home from work at the Warner Thea-

tre. We are happy to report that his injuries were not serious and that Jim, despite his 70 years, is none the worse for his mishap.

- Herb Aller, business agent for Camera-men's Local 659 (Hollywood), has had considerable success in his negotiations with the television stations in his jurisdiction. He believes that a closer tie between cameramen's and projectionists' Locals in negotiations with tele stations would be of considerable benefit to both groups, and he has some excellent ideas

Dallas Local 249 Awards Gold Membership Cards

At the May 11 meeting of Dallas Local 249 gold membership cards were presented to three of its old-time members. Shown in the photo at the right are three of the four holders of gold cards in the Local. The fourth member of this group, not shown in the picture, is IP's Harry Sherman, who was awarded a gold card June 30, 1947. Shown here are C. E. (Red) Rupard, former business agent; Henry Sorenson, Modern Theatre Equipment Co., and Jahn H. Hardin, Hardin Theatre Supply Co.



Recipients of the gold cards (front row center) pose with Local 249 officers after the presentations. Back row, left to right: James Blaydes, sergeant-at-arms; Harvey Hill, Sr., business agent; Eddie Miller, IA representative; J. J. Schaefer, president; Paul Humphries, treasurer; W. E. Estes, Jr., financial-secretary. Front row, left to right: C. L. Bangersan, chairman of board of trustees; Harvey Hill, Jr., recording-secretary; C. J. Moore, vice-president; Rupard; Sorenson; Hardin, and Earl Midlin, Jr., trustee.



Out-of-town visitors attending the meeting were, back row, left to right: C. L. Halt, Waco Local 587; Harvey Hill, Sr., Dallas Local 249; Eddie Miller, IA representative and business agent, Houston Local 279; Tommy Rich, and D. A. Brandon, Carpus Christi Local 604. Front row, left to right: Hersel Dunn and Tony Youp, Local 597, Waco.

on the subject, gained from personal experience, which he will be glad to pass on to interested parties. You might also ask Herb for a copy of the letter he sent to a number of West Coast Locals last year.

- Within the ranks of the IA we have many flying enthusiasts, as noted from time to time in this department. The latest one to come to our attention is Jack Skinner, member of Houston Local 279 and supervisor of sound and projection for Interstate Theatres. Jack is proud of his prowess at the controls and defies any commercial pilot to beat his flying time between Dallas and El Paso.

- If hard work and concentrated effort be any indication of success, then the 40th anniversary party Los Angeles Local 150 is planning for July 8 next will top all such events. George Schaffer, business agent and chairman of the arrangements committee, with the able assistance of Jimmy Pointer, is hard at work these days ironing out all the details necessary to make this celebration one to be long remembered.

- You'll be seeing the following nice fellows as delegates from projectionists' Local 150, Los Angeles, at the IA Convention in Cleveland: George Schaffer, Charley Vencill, Paul Mahoney, Joe Pylet and Earl Spicer.

25 Years Ago—June 1923

- Pat Ryan, secretary of the 11th District (Canada) issued a call for a District meeting to be held at the Chateau Frontenac, Quebec City. Ryan's illness prevented him from being present at the meeting. . . . IA Locals advised by the General Office to present new wage scales and contracts to employers at least 30 days before expiration date of existing agreements. . . . A bill introduced in the Pennsylvania State Legislature which would have taxed motion picture projectionists was defeated. IA representative Krouse strongly opposed the measure. . . . The management of the Strand and Ben Ali Theatres in Lexington, Ky., was accused by Local 346 of violating the terms of the existing contract. Local 346 expelled the men who remained at work despite a "cease service" order, and the action of the Local was upheld by Bill Elliott, IA 5th vice-president, who investigated the situation. . . . New Locals added to the IA—Local 229, Fort Collins, Colo., and Local 611, Salinas, Calif.

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MANUAL

Presenting: Elmer C. Winegar

"THE full life" would serve admirably as a title for this sketch of the many-faceted activities of Elmer C. Winegar, whose industry and aptitude for an amazing variety of activity has spanned more than 40 years and, while occasionally detouring him down the byways, has always led him back to the main highway of show business.

Winegar has been treasurer of Buffalo Local 233 for the past 11 years, but some idea of his long experience in the amusement field may be gleaned from the fact that he was the first secretary of this organization away back in 1910—four years after he started in show business as a ticket-taker at the old Bijou Dream movie house. Later he became manager of the Grand Theatre, and followed up by managing the Scenic Railway Motion Picture Theatre at nearby Olcott Beach.

Apparently bitten by the carnival bug, Elmer in 1909 went over whole-hog to the outdoor field, becoming manager of concessions at Sylvan Beach, operator of Athletic Park (later Luna Park) and subsequently serving as general agent for George Kleine Attractions and manager for the incomparable Annette Kellerman shows, first of the bathing beauty crop.

Commercial Lab, Civic Activities

Evidently determined to run the gamut of show business, Elmer next operated a motion picture laboratory under the name of Winegar Pictures, which did commercial work for such accounts as

Pierce Arrow Motor Car Co., Lumen Bearing, Shredded Wheat, Curtis Aeroplane, Larkin Soap, American Radiator



Elmer C.
Winegar

and, to keep his hand in, The Great Houdini.

Elmer really went to town in terms of civic activities during the World War I period. He organized the Home Defense League, the 12th Division Relief Association, the Smokes-for-Soldiers campaign, and was chairman of the 12th Division Instruction Board for Draftees. The foregoing were just a few aspects of a maze of activities which included directing many recruiting and bond-selling drives.

Before returning to the theatre field Elmer had another whirl at civic activity by serving three years as Director of Licenses for the City of Buffalo and another 18 months as director of the Buffalo Memorial Auditorium and Civic Stadium. Not even the publishing field was left to languish without feeling the impact of the Winegar personality, for Elmer managed the *Central Park News*, a Buffalo community newspaper.

Early this year Elmer was elected Illustrious Potentate by Ismailia Temple Shriners. Other Masonic affiliations are in Tyrian Lodge, F. & A. M., Buffalo Consistory, A.A.S.R. and Zuleika Grotto, M.O.V.P.E.R. His clubs include the Mercer and the Greater Buffalo Advertising.

It appears unlikely that Buffalo, cosmopolitan though it be, offers other possibilities for keeping one person busy, since Elmer Winegar hasn't discovered them.

Philips 16-mm Export Exclusive

Philips Export Corp., subsidiary of the famous Holland research and manufacturing company, has been named exclusive export representative for the new Forway (Corp.) 16-mm sound projector. Both firms are located in N. Y. City.

RCA Institutes in New Quarters

RCA Institutes, oldest radio training center in America (more than 35 years) has removed from 75 Varick St. to new and greatly enlarged quarters at 350 West 4th St., N. Y. City. School has 1750 students, 60 instructors.

IA ELECTIONS

LOCAL 1, NEW YORK, N. Y.

Joseph Dwyer, *pres.*; Geo. Fitzgerald, *vice-pres.*; John McDowell, *sec.*; John Garvey, *treas.*; Solly Pernick, John Goodson, *bus. reps.*; Eddie Mortimer, *sgt.-at-arms*; Jack Shapiro, Vincent Jacobi, John Brosseau, *trustees*; Joseph Dwyer, John McDowell, John Garvey, Vincent Jacobi, Solly Pernick, Eddie Gately, Harry Abbott, Louis Yeager, John Goodson, Bernie Quattrocci, Geo. Fitzgerald, Meyer Harris, Jack Shapiro, and John Brosseau, *del. to IA Convention*.

LOCAL 165, HOLLYWOOD, CALIF.

Walter McCormick, Jim Eddy, and Dick Hennley, *del. to IA Convention*.

LOCAL 249, DALLAS, TEXAS

Julius J. Schaefer, *pres.*; Curtis Moore, *vice-pres.*; Harvey D. Hill, Jr., *rec.-sec.*; William R. Estes, Jr., *fin.-sec.*; P. W. Humphries, *treas.*; Harvey D. Hill, Sr., *bus. rep.*; J. B. Blaydes, *sgt.-at-arms*.

LOCAL 771, NEW YORK, N. Y.

Robert Klager, Charles Wolfe, Jack Oxtan, and Wm. Van Praag, *del. to IA Convention*.

Theatre Television: A General Analysis

By DR. A. N. GOLDSMITH

III. The third installment in a series wherein are discussed in detail the many problems incident to the launching of theatre television.

THE more widely distributed the television program, the more economical the operation. This would indicate that large-scale producers will build up national syndication facilities of one sort or another. It cannot be stressed too strongly that quality of performances and economy of operation (in terms of program cost *per member* of the audience) depend considerably on national syndication.

The principal types of interconnection of cities (and theatres) for national syndication are by coaxial cable or by radio-relay systems. A coaxial cable is really a hollow conducting pipe with an insulated central conductor running through it. A radio-relay system is a series of "booster" stations each of which picks up the incoming signal, amplifies it in one way or another, and sends it along in strengthened form to the next "booster" station.

Cities not lying directly on the network will require side-line or "spur" feeders to carry the program to them. Sometimes this may be a rather costly procedure as, for example, in the far Northwest.

If radio facilities are used for syndication, it will again be necessary to assign appropriate frequencies for their operation, such authorization coming from the F.C.C.

National Syndication Problems

A number of other problems will arise in connection with national syndication. For one thing, there is a three-hour difference between Pacific and Eastern times. It may prove necessary to divide the country into time zones and to utilize syndication primarily within one (or two adjacent) time zones. Alternatively, recorded programs may be repeated one, two, or three hours later as desired.

Although national syndication offers the best promise of markedly reducing the cost of tele programs per member of the audience and therefore of improving program quality, it probably will be a delayed achievement because it is, after all, an extremely large-scale and costly operation involving substantial capital investment and operating costs.

In the early days of theatre tele the extreme novelty and mystery of such pro-

grams will attract the audience on a curiosity basis, if nothing else. It would be easy enough today to fill theatres, for a while, with audiences eager to see large-screen tele of any reasonably acceptable technical quality, and almost irrespective of the nature of the program.

Yet it will not be long before theatre audiences will come to regard theatre-tele programs as just another sort of picture in motion, though not a motion picture. After all, the picture will appear on the screen with its accompanying sound in much the same way as do the film presentations. When that day comes, tele programs will be accepted mainly on their intrinsic quality. That is, the originality and dramatic or comic interest of the program will determine audience acceptability.

Program Material Vital

Accordingly, those who produce theatre-tele programs must, through ingenuity and good showmanship, discover those things which tele can do particularly rapidly, convincingly, with human appeal, and with convenience. Only in this way can tele programs assume a position of importance beside motion picture material in the theatre.

As previously stated, news and sports events and happenings of major importance will afford certain program material. But personal and live-talent presentation of a special nature will possibly be of considerable interest. Tele programs will always depend for their appeal, in part at least, on "immediacy."

Tele is particularly capable in the realm of permitting events to unfold, so to speak. That is, wherever the outcome is unknown and unknowable, tele can present material of peculiarly appealing human interest. For this reason, it is likely that the techniques of theatre tele and of motion pictures in theatres will run along parallel rather than con-

Erratum—In the articles "Screen Data: Types, Sizes, Illumination for 35- and 16-mm Film Projection" in IP last month (May) the captions for Tables C and D (page 10) were inadvertently transposed. Both tables, incidentally, were practically self-explanatory.



RCA's new 35-mm sound-film TV projector (Brenkert) employs an electronically-triggered, h-i "gap lamp" which is virtually free of heat and eliminates the shutter. Periodic flashes of the lamp, coupled with a special film drive mechanism, enables use of standard 35-mm film, normally operating at 24 frames p. s., to provide the 60 interlaced fields, or 30 frames p. s., required for TV.

Projectionist is shown at manitor and change-over control rack, which contains switches for remote starting and stopping, as well as remote controls for a slide projector.

verging paths. And it is well that each should remain a different and distinctive type of theatre entertainment.

It is certain that other as yet undisclosed and amazingly attractive technical and program possibilities exist in the theatre-tele field. The engineers and showmen of the future are indeed offered a major opportunity to develop a new and important art.

Proposed Exhibitor Procedure

Exhibitors might naturally inquire what, at this time, would be a suitable procedure for them so that they may be prepared advantageously to enter the theatre-tele field and may take all such steps as shall make likely their success.

The present owners of theatres will be well advised to insist that their group representatives study the field of theatre tele, through committees or otherwise, and report back. It would be well if exhibitors were periodically to receive bulletins or reports descriptive of the technical, commercial and program status of theatre tele. Since the individual will be unable to accumulate such information in his available time, the task should be delegated to exhibitor organizations.

Theatre owners would also do well to install tele receivers in their homes or in their offices. They should systematically follow local tele programs so that they may see how that art is developing. Some of the tele programs may be "good

theatre," others may not. By becoming acquainted with tele in this fashion, the exhibitor will have a better idea of what can be accomplished with tele.

The exhibitor should also keep in touch with the technical societies, notably the SMPE. He should also follow the development of theatre tele in the trade press and should as well subscribe to the magazines dealing with tele itself along broadcast lines. In this way he will know more about program structure, commercial problems, and the general development of the art.

Even more concretely, the exhibitor should study the possible tele installations in his own theatre. On the basis of the material in the present analysis, he should keep in touch with manufacturers of theatre-tele equipment and in due course, secure their advice and estimates on installation of equipment whenever available. This, however, may not be for several years.

Before doing this, however, it would be well to confer with a competent architect acquainted with theatre design so that any installation problems may be analytically considered. Only in this fashion can the exhibitor know what he is doing.

Engineering, Architectural Problems

In view of the complexities of theatre design, and of recent important advances in that field, the prospective owner should be certain that his engineer and architect are alike well qualified. In this connection it must be stressed that the design of a theatre for both motion pictures and tele requires excellent engineering guidance both from the consulting engineer and from the equipment manufacturer.

Only with such information will the theatre owner be likely to secure from his architect designs which will prove practical and economical in operation. In this connection it may be mentioned that, considering the possible rapid rate of the development of both motion pictures and tele in theatres, the design of future theatres should be far more flexible than in the past. Space limitations forbid mentioning the various details involved.

In summary, all exhibitors, present and future, should study, discuss, and understand tele equipment, operations, programs, and economics. They should keep in touch with sources of dependable information in these fields and should endeavor to draw their own conclusions systematically as the art develops.

[To Be Continued]

ASA National Standards List Ready

An up-to-date list of all national standards approved by the American Standards Assoc. has just been published and is available free of charge upon application to 70 East 45th St., N. Y. City, 17.

THAD C. BARROWS

Thad C. Barrows, for 29 consecutive years until 1947 president of Boston Local 182, died as the result of a heart attack on June 2. He would have been 60 years of age next month. A charter member of Local 182 (1910) his last elective office was as a delegate to the forthcoming IA convention.

Remarkably gracious-mannered and considerate of everybody regardless of their station in life, Barrows' great popularity within the IA in general and in projection circles particularly transcended his many years of service as an official of an important Local Union and his unbroken string of designations as a convention delegate. Actively engaged at his craft in Boston's Metropolitan Theatre until the day of his death, his interest in technological developments and in craft welfare never flagged.

Recognition of his deep sincerity of purpose and unselfish interest in craft advancement was forthcoming in 1929 when Barrows was unanimously elected the first president of the Projection Advisory Council, a national organization which served admirably to advance craft interests during the difficult years that witnessed the introduction of sound motion pictures. He was a frequent contributor to IP, his observations being invariably related to craft welfare and improved technique. He was a member of the SMPE for 20 years.

Barrows had an insatiable curiosity about distant places and peoples, attested to by his two trips through Europe and his many tours all over America. Neither far-off places nor the usual barriers of custom or language created any great difficulty for Barrows in his travels, his innate humaneness serving as an open sesame wherever he found himself.

He had one great interest apart from his Local and his craft—the Boston Red Sox



baseball club. If, as he remarked recently, "Local 182 is as much a part of me as my right arm," then surely the Red Sox had priority on his left one. He accompanied the team South on several Spring training trips.

The funeral service for Barrows served to emphasize the high regard in which he was held by all who knew him. In addition to innumerable representatives of Local Unions, of the IA General Office, of fraternal, civic and social organizations, and of other branches of the industry—many of whom travelled from afar to be present—the services were attended by every single house manager, and many of their assistants, of the M. & P. theatre circuit which operates 25 theatres in Greater Boston.

The profusion of flowers at the service, and these few written words, are quite futile to express adequate tribute to Thad Barrows. No higher tribute could be paid him than to say he left his mark—the mark of a sincere, courageous and honest-souled Union man—on all those with whom he came in contact. He could do no other, of course, for these qualities were graven on his heart.

Screen Sound Transmission

Several inquirers and all other interested in sound screen transmission characteristics are referred to the appended standard as promulgated by the American Standards Association:

The sound transmission characteristics of perforated projection screens shall be such that the attenuation at 6000 cycles, with respect to 1000 cycles, is not more than 2½ db, and the attenuation at 10,000 cycles, with respect to 1000 cycles, is not more than 4 db. The regularity of response shall be such that there is no variation greater than ± 2 db from a smooth curve at any frequency between 300 and 10,000 cycles. The general attenuation at and below 1000 cycles should not be greater than 1 db.

Transmission Measurement Data

The sound transmission of the screen shall be measured by means of a loudspeaker, fed by an audio oscillator and amplifier, behind the screen, and a calibrated microphone, amplifier and output meter in front of the screen. The loud-

speaker shall be of the type normally used in motion picture theatres for the size of screen being tested, and shall be placed with its axis not less than 2 feet from an edge of the screen with its mouth parallel to and separated from the screen by 4 to 8 inches (center cell in the case of a curved front multicellular horn).

The microphone shall be located 10 to 12 feet in front of the screen and on the axis of the loudspeaker. The sound transmission of the screen at any frequency is then the difference in the sound level measured with the screen in place and with the screen removed.

Cellophane 16-mm Film Containers

Supplanting metal cans used exclusively heretofore for the shipment of 16-mm films, Distributors Group, Inc., of 756 West Peachtree St., N.W., Atlanta, Georgia, has developed a Cellophane container which they assert has demonstrated its complete superiority over any other type container. Base of the new container is Du Pont Cellophane No. 300. Details are available from Distributors, Inc.

The Ballast Rheostat: Its Effect Upon Arc Stability

By ROBERT A. MITCHELL

ONE of the most important features of any projection installation is the source of current for the arc lamps. Most theatres employ constant-voltage (c-v) motor-generator sets in conjunction with ballast rheostats. Rectifiers of the dry-disc, or stack, type are also very popular. A few theatres use falling-voltage (f-v) generators, others use rectifiers of the tube type, and some—a very few—take their arc current directly from d-c mains. The use of a-c arcs is very limited.

Whatever the source of power, it must furnish current with what is known as a "drooping" voltage characteristics if the arcs are to burn steadily and give a minimum of trouble. The common c-v arc generator, however, supplies current at a *constant*, rather than a *drooping*, voltage.

The field windings are "compounded" in such a way that the voltage output of the generator remains at practically the same level under widely varying loads. A ballast resistance is connected in series with an arc powered by a c-v generator in order that the voltage at the arc (arc drop) may fall off as the current (measured in amperes) increases. The c-v generator is therefore admirably fitted for the job of supplying current to several arcs connected in parallel—each arc having its own ballast rheostat, of course.

Figure 1 is a diagram of an elementary arc circuit for one lamp. No switches,

fuses or meters are shown. This diagram shows the points at which ballast-drop and arc-drop, as well as generator voltage, can be measured with a voltmeter. (In the interest of simplification, line-drop has been ignored.)

Ballast a Necessary Evil

The ballast rheostat is a necessary evil. Its use is mandatory for stabilization of the arc, but in its work of assisting the projectionist it wastes approximately 31% of the current in the case of a 32-ampere, low-intensity arc, and approximately 22% in the case of a 46-ampere, high-intensity arc. (These figures are for minimum permissible values of ballast.) All the current consumed in the ballast rheostat is dissipated in the form of useless heat.

Why not design a generator having a drooping, instead of a c-v, characteristic and thus eliminate the wasteful ballast? Such generators are available. They are known as falling-voltage (f-v) generators.

When the load increases in an f-v generator circuit (more amperes consumed) the voltage decreases. This is precisely what is needed for the arc, either high- or low-intensity. No ballast is required as is the case in a c-v generator circuit.

These considerations might lead us to believe that the f-v generator is the answer to our prayers. Unfortunately, an unpleasant surprise is in store for us if we

connect two arcs in parallel to such a generator. Suppose one arc is burning. When the second arc is struck, the load on the generator increases. As a result

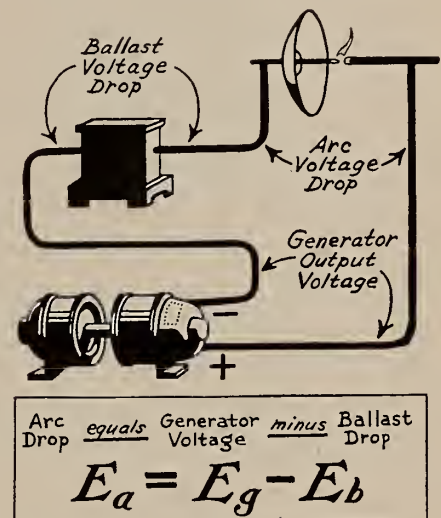


FIGURE 1

of the drooping characteristic, the voltage then falls off to a very low value. The arc in the operating projector snaps out.

To overcome this very serious difficulty the lamps may be connected in series through shorting-out switches. The arc in the "dead" projector is short-circuited. When the projectionist desires to light it, he must bring the carbons together into firm contact and then open the short-circuiting switch of the lamp. A moment before the changeover he may separate the carbons to the proper gap length.

After the changeover the lamp on the run-out projector is short-circuited. The increased resistance of the circuit during the interval when both arcs are burning is compensated for by a spontaneous increase in the generator's output voltage.

There are a number of undesirable features inherent in a series hookup such as this. It is unfortunate that the f-v generator has become so closely associated in people's minds with series operation, for such generators are very good units and they effect some saving in power consumption by eliminating wasteful ballast. Good projection practice demands, however, that when f-v motor-generator sets are used there be one motor-generator set for each arc lamp.

Rectifiers designed for projection service are also f-v devices and do not require

(Continued on page 29)

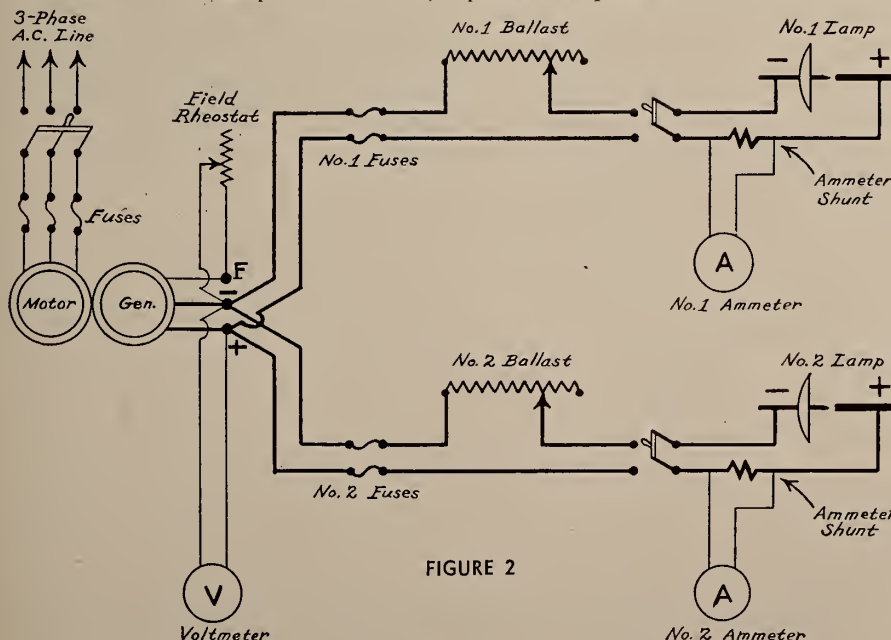


FIGURE 2



TELECASTS

TV Dents Movie Box Office, Ad Agency Survey Shows

PRETTY persuasive evidence as to the place of the movie theatre as presently constituted in the television scheme of things was forthcoming from several quarters during the past month. In none of these developments is there much comfort for those who, ostrich-like, think that the video wave may be rolled back by wishful thinking.

Most compelling attention-getter was the result of a survey conducted by Foote, Cone & Belding, one of the country's largest advertising agencies, which showed that even the present restricted circulation of TV is hurting the movie box office by an estimated \$3 million annually. And the worst is yet to come when TV activities reach flood tide at the end of this year.

Figures Emphasize TV Trend

The survey revealed that 20% of those who own TV sets attend the movies less frequently than do their neighbors without sets. Community involved was Hempstead, Long Island, N. Y., with the findings projected to the national scene, which makes the figures admittedly "loose." Significantly, however, the novelty of TV exerted very little influ-

ence on the results, since some families polled had owned their sets as long as nine years.

Details of the survey were presented at the recent SMPE meeting by Ralph Austrian, vice president in charge of TV for FC & B agency. Austrian was most emphatic on one point: that 58% of TV families attend the movies less since they bought their sets. Here's the survey scorecard:

	Before	After
Attended films every		
few days	57%	5%
Once a week	33	68
Every 2-3 weeks . . .	10	62
Once a month	6	24
Infrequently	1	14

Ad agency emphasized that families surveyed were previously among best film customers, that not only do they now go less often but an important segment "seem to get less enjoyment from movies after becoming accustomed to the convenience of TV sets." (This has long been IP's contention, notwithstanding the opinion of "experts" who pin their hopes for sustained movie patronage on people's natural gregariousness.)

To the direct question about enjoyment, 14% said they enjoyed films less, which percentage was slightly higher (18%) among those who had owned TV sets six months or more. This is a pretty good answer to those who depend upon the public forgetting about TV and returning to the theatre after the novelty wears off. Significance here is that once a movie house patron is lost it requires "dynamiting" to get him back.

IP readers may interpret the foregoing as they choose, but it should not be forgotten that, apart from the producers, who stand to be o. k. in any event by reason of making films for video, there is now no exhibitor activity in TV apart from much gab, there is no theatre TV equipment available in any quantity, and there are no channels either assigned to or contemplated for the movie theatre field.

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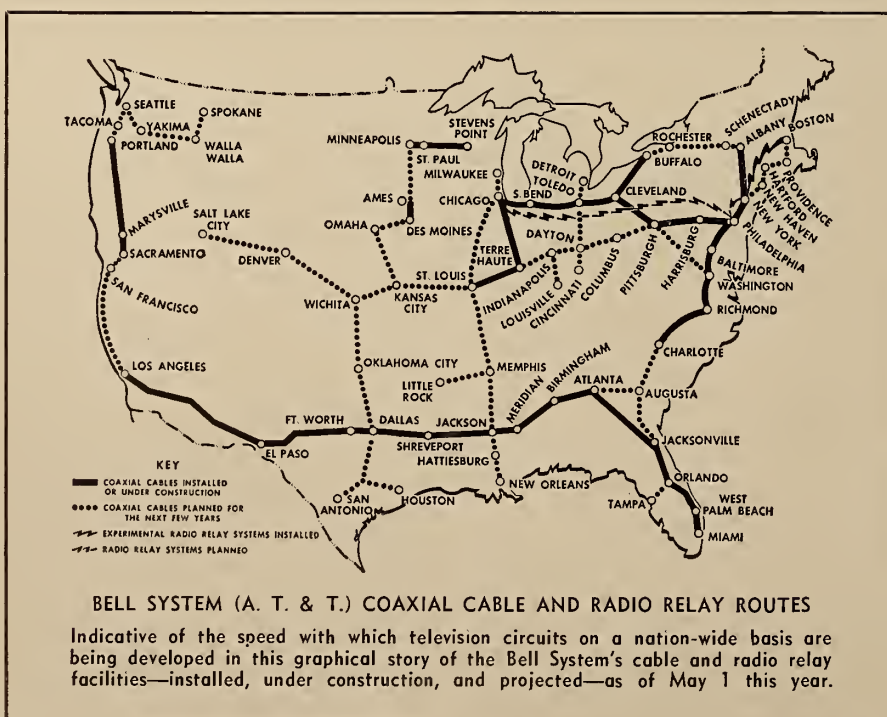
In typical Hollywood fashion, which means that the event was not without its humorous aspects, Paramount, 20th-Fox and Warners joined hands to present on May 21 at the Warner Studios instantaneous TV pictures under regular theatre conditions.

RCA provided the equipment, evidently the product of its close working agreement with Warners and 20th-Fox during the past six months, SMPE played host, and Par's KTLA broadcast the show, which was a remote pickup of track events at the Los Angeles Coliseum. Screen image was very good on the whole, being clear and brilliant and evidencing only little graininess and the usual TV distortions.

Warner High-Speed Processing

Humor was interjected when Nathan Levinson, Warner technical big-wig, announced that this was "an off-the-record report to the SMPE indicating the state of the art as it is today. We prefer no publicity be given tonight's meeting because we are not ready for it. We are still in the throes of development." This while Warner's Stage 7 was jammed to capacity by 3000 people, including the entire SMPE contingent, the entire convention of the National Broadcasters Assoc. ("coincidentally" in session at the same time as the SMPE) and a horde of other picture people.

Warners demonstrated its high-speed processing equipment which, much like



the Paramount system, processes film from telecasts in 71 seconds. Equipment consists of four units: water heater, film dryer, developer and power control panel.

Novel note was in the big-screen image of speakers at the technical session who, standing about 20 feet away, were pictured walking from one piece of equipment to another and explaining each unit. Extension of this method to conventions and large exhibits is a natural.

TV Roundup—TV will require 3650 hours of film annually on the basis of 1825 two-hour features or 14,600 fifteen-minute shorts, plus all the additional material they and the remaining 500 independent stations will use which is not network-originated, W. W. Watts, RCA v.p., told the SMPE. Projected channel revision by the FCC would make possible 953 TV stations in 456 cities, he added, serving an estimated 66 million sets in 40 million homes.

WPIX, new Daily News TV station in New York, has closed a deal for 24 movie features made by Alexander Korda. . . . Record in processing film for TV claimed by Dumont in method for recording a televised program on film after which it is developed, reversed and delivered ready for projection in 20 seconds. This we have to see. . . . Major film producer executives are saying it right out loud now: "We are manufacturers of entertainment and we will keep on being manufacturers no matter what channels of distribution are," said Spyros Skouras, 20th-Fox prexy. He foresaw a distribution system similar to that of Muzak whereby programs are piped over wires at a set charge. Do you want a more candid statement?

TV set ownership reduces movie theatre attendance, pontificates Southern California TOA, but "when the novelty wears off TV will find its proper place in the entertainment field." Oh yeah? See survey results elsewhere in this department. . . . TV receivers in Hotel Roosevelt, N. Y., rooms are credited with increase of 400% in room service. Average per room has jumped from \$35 to \$175 per month.

Toler's 'Amusement Center' Mag

Amusement Center, new publication covering five major amusement industries, will bow September next. To be published monthly by J. Harrison Toler Co., 225 No. Michigan Ave., Chicago 1, Ill., publication will comprise five separate editions, plus an identical "multiple enterprise" feature section in each edition, covering the planning, financing, construction, equipping, maintenance and managing of:

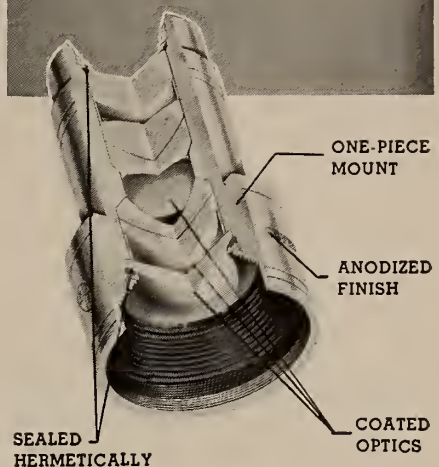
(1) Motion picture, legitimate, variety and repertoire theatres, school auditoria; (2) bowling and billiard establishments; (3) night clubs, hotel supper clubs, town and country clubs, ballrooms and dance studios; (4) radio and television studios, and (5) sports arenas, swimming pools, baseball parks, college stadia, etc.

Editorial and advertising staff will be headed by J. Harry Toler, recently resigned managing editor of *Modern Theatre* section of *Boxoffice*.

TESMA Show Space Going Fast

Another warning anent the growing shortage of booth display space at the forthcoming TESMA Trade Show, slated for the Jefferson Hotel, St. Louis, Sept. 28-30, has been issued by Secretary Roy Boomer. Ray Colvin, prexy of TEDPA, dealer organization, is cooperating on arrangements.

HERE'S WHY THE SUPER-SNAPLITE IS UNEXCELLED!



SIX ELEMENTS

A true Anastigmat for pictures wire-sharp to the very corners . . . in black-and-white or color!

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No dust or oil can enter the Super-Snaplite . . . it never needs to be taken apart for cleaning!

ONE-PIECE MOUNT

This sturdy all-aluminum one-piece mounting can't loosen up or leak oil!

ANODIZED FINISH

The gleaming gold finish of the Super-Snaplite is an integral part of the aluminum . . . it can't chip or flake off!

COATED OPTICS

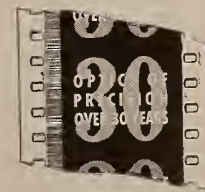
Durable anti-reflection coating on each glass-to-air optical surface nearly doubles the light transmission . . . gives brighter pictures, higher contrast!

SPEED OF 1/1.9

Exceptional speed for the utmost in screen brilliance without extra current consumption!

OTHER SNAPLITES

The 1/2.0 Snaplite Series II—hermetically sealed . . . critical definition . . . coated optics. For smaller theaters: the 1/2.3 Snaplite Series I—coated optics optional. For complete details on all Snaplite lenses, get Bulletin 204 from your local supply dealer.



KOLLMORGEN

2 Franklin Ave. *Optical* CORPORATION
Brooklyn 11, N. Y.



NEW POSITIVE way to PATCH FILM Permanently



NOW ALL film can be actually welded together. Applied freely to film ends, FILM-WELD dissolves film—fuses it into one lasting piece. Easy to use for hand or machine splicing. Retains its strength!

Use FILM-WELD to patch ALL types and makes of film—8-mm. 16-mm. 35-mm. Trucolor, Technicolor, Kodachrome, Nitrate and Safety Film.

Available in 1 and 8 oz. bottles and 16 oz. cans. Follow the lead of projectionists in countless theaters who are already PERMANENTLY patching film with FILM-WELD.

Projectionists favorites also are ZIPPER CHANGEOVERS to guarantee continuous performance; Strong Universal Rewind Mules, the fool-proof "mule" that fits any enclosed rewind; and Strong Reel-End Signals.

ESSANNAY ELECTRIC MANUFACTURING CO. . . 1438 NORTH CLARK STREET, CHICAGO 10

PSYCHOLOGY OF SOUND FILMS

(Continued from page 9)

positive sense—indicates that the future usefulness of the medium in this field may transcend in importance its application to entertainment. The social scientist, particularly the social psychologist, has discovered unequaled powers in the sound film to influence the minds and emotions of people for better or for worse.

The producers of sound films for commercial and educational purposes are probably better acquainted with the psychological impact of the sound film and the techniques for producing desired attitudes and responses with it, than any other factors in the motion picture industry.

They begin with a study of the audience, the occasion, the objective of the film, and the idea content for it, and they employ the various elements of the medium to create the desired impression upon the mind and nervous system under the audience's mental "set" toward the film's subject matter.

To appreciate fully the significance of this approach, try designing a sound film. It will be quickly realized that something more is involved than cameras, film stock, and sound channels. Probably the most

important lesson that the Armed Services learned in their vast film program was that the creation and production of sound films had best be left to those who best understand the medium as an instrument of expression; therefore as a tool for the shaping and control of psychological factors.

George Arliss, whose experience on the stage, in silent motion pictures, in sound movies and in writing for publication qualified him to speak, vividly characterized the uniqueness of the sound film as an art form. He said that there is a greater difference between the sound motion picture and the silent motion picture, as a medium of expression, than there is between the silent motion picture and the printed page. He averred that he had to learn to act all over again when sound came into pictures.

Influencing People in Groups

The sound film is, by its very nature, a medium for influencing minds in groups, whereas other mediums of communication, such as the printed page, posters, and radio, influence minds as individuals. The reader of a magazine or the listener to a radio program reacts to the message that reaches his mind as an individual, whereas the member of a sound-film audience reacts to the film as

a unit of a co-acting group. Social psychology, as well as individual psychology is, therefore, at work in the film audience.

Consider the psychology of the audience situation of the sound film. The audience are seated in rows, all facing toward a common source of sensory impressions. This regimentation of their bodies tends to induce a corresponding regimentation of their minds. In the regimented film audience "social facilitation" is at work; that is to say, the reactions of one member of the group are "sensed" by his neighbors and tend to spread from one to the other, like a contagion.

A related phenomenon results—the "impression of universality," or the conviction that what is true for one individual is true for another. This is a vital factor in credibility. Of course, social facilitation and the impression of universality prevail in almost all audiences, but not to the degree that they do in the sound-film audience, because of other factors in the medium.

Prestige of the Sound Film

The sound film has *prestige*, an important quality in any medium. Its prestige is not derived solely, however, from its association with Hollywood and the glamour of sound-film-production technology. Most of its prestige is derived from the unique qualities inherent in the medium itself, particularly the intensely concentrated attention it demands.

Prestige is also derived from the *occasion* of the film showing: the audience has assembled especially to see and hear the film and everybody submits to its dominating influence. The *authority* of the spoken word and the vivid visual-action images that are burned into the mind, add to the prestige of the medium. There is no other medium of expression—the largest, most popular magazine, the world's largest spectacular, or the biggest national network—that can match the impact of the sound film in so far as the prestige of the medium is concerned.

'Polarization' of Attention

There are psychological factors in the conditions under which the sound-film message is received that are no less important than those of the audience situation. Consider the fact of the darkened room, with all extraneous sounds shut off, in which the sound film does its work. The two primary sense organs—those of sight and hearing—are focused on a single source of sensations: the screen and the loudspeaker.

The effect created is akin to that of hypnosis, for to put a person "out" the hypnotist induces him to focus the attention of his eyes on a single point while he drones something into the subject's ears. The sound film, likewise,



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"polarizes" the attention to almost the same degree and induces in the subject a state of suggestibility similar to that induced by the hypnotist.

Scientific proof of the intensity of the concentration of the attention of the sound-film audience to the influence of the screen and loudspeaker has been provided on many occasions, by many experimenters. They have flashed bright lights and rung bells to distract the attention of the sound-film audience and have taken pictures of the audience's reactions. These have shown nothing but momentary glances away from the screen.

The mind that "wanders" along any paths except those directed by the screen story is almost unknown in the sound-film audience. The salesman or propagandist who wishes to *hold* attention to his sales message can do it beyond peradventure in this dynamic medium. "Spellbound" is not too strong a word for describing the attention-compelling power of the sound film.

[To Be Continued]

AMERICAN TRADE UNIONS

(Continued from page 14)

the convention authorized the Executive Council to give every assistance possible. A large number of organizers were placed in the automobile field. Progress was made. A number of local unions were organized. But the industry refused to meet with union representatives at the conference table, emphatically asserting that management would not bargain collectively with its employees. However, a number of these local unions persisted until the secession of the C.I.O. resulted

in a National Labor Relations Board election which gave the C.I.O. full negotiating representation.

The determined refusal of many large corporations and industries to bargain collectively with organized employees was overcome by the enactment of the Wagner Act. This made organization possible for the lesser-skilled, the employer's hostility notwithstanding. Had there been no division caused by the C.I.O., organization in the mass production industries of the A. F. of L. would have been successful because of the Wagner Act.

The Federation for a number of years had been testing the ground and had become familiar with the best approach to bring these workers into the fold of the American trade union movement. A continually growing number of organizers was being trained by the A. F. of L. for work in this field, and these were receiving the active cooperation of the organizers of the craft unions.

Then came the C. I. O., reintroducing the concept of nation-wide industrial unionism, supplemented by partisan political activity by labor.

Reasons for C.I.O. Secession

The factors leading to the secession of several powerful internationals from the Federation and their reasons for organizing the C. I. O. were many. There were personal ambitions and personal rivalries. There was the desire of a minority to have its way regardless of the stand of a goodly majority. Without doubt there were those who believed that the general policy of the Federation was not sufficiently aggressive to cope successfully with the changing conditions in modern industry. Not a few were convinced that labor must be led into partisan political action.

In addition, there was pressure being brought to bear by outside influences, including prominent figures in the national administration on the one hand and the Communist party on the other, with intermediate groups consisting of intelligentsia, social uplifters, professional reformers and those who, having failed to win their way to prominence but glib of tongue, believed the C. I. O. to be their golden opportunity.

Inside the A. F. of L. tension had grown for several years. The assertion was repeatedly made that the A. F. of L. program to organize the mass production industries had failed because of the internationals' insistence upon craft distinction. That issue came to a focal point at the Atlantic City convention of the Federation in the autumn of 1935.

The international unions which later seceded insisted at this convention that the Federation specifically commit itself to the policy of outright industrial union-

ism for all mass production industries. As this involved abandoning the highly-skilled craftsmen affected, the internationals could not give their consent. However, they definitely approved a single organization to include all semi-skilled and lesser-skilled workers.

Immediately after the convention adjourned, the secession took place. The first reaction was what had been anticipated. The Communist party officially endorsed the C. I. O. and its leader. Once more the issue between industrial unionism and partisan political action on

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the one hand and the Federation's well-established policies on the other created division and discord in labor's ranks.

It was a repetition, on a larger scale, of the conflict of ideals, ideas, policies and personalities which had divided labor into hostile camps in the late 1890's and the early 1900's.

Attitude of the N.L.R.B.

In the beginning of the fight the A. F. of L. seemed at a disadvantage. The C. I. O., new and more spectacular, enjoyed the newspaper headlines. The intellectual, the radical and the Communist press were all busy writing the Federation's obituary. Official Washington gave little comfort to the A. F. of L., while openly assisting and encouraging the C. I. O. The N.L.R.B. acted as though its function was to build up the C. I. O.

Never before had so flagrant a difference arisen between a federal statute and its administration. The N.L.R.B. was so high-handed that when the first member of the Board was renominated by the President, the Senate refused to confirm him. When the term of the second member, Edwin S. Smith, expired, he was not even renominated, a poll of the Senate having shown that he could not be

confirmed. The C. I. O. gave him employment with a generous salary, but Mr. Smith was finally dropped.

The first chairman of the Board, J. Warren Madden, possessed high integrity of character but was unqualified for his position because of a lack of practical knowledge of industry and the relations between employer and employee, the man-to-man basis of understandings. He had been successful as a teacher of law. Mr. Madden would probably also have failed of Senate confirmation had he been nominated for another term. Instead, he was nominated for the Federal bench, where he was qualified by intellect, training and fine moral character to be of much more practical value to his country.

[To Be Continued]

20th-Fox Income Off \$5½ Millions

Decline of \$10½ millions in 20th-Fox income during 1947 is accounted for by a drop in theatre receipts of \$5½ millions and a reduction in film rentals of almost \$5 millions, with most of the latter being due to restrictions on currency withdrawals imposed by the United Kingdom. Sharp drop in theatre receipts is viewed with some alarm inasmuch as it does not reflect any decrease in admission prices.

ROUXCOLOR STIRS FRANCE, U. S.

TRANS-ATLANTIC cables have been humming the past few weeks with reams of copy relative to Rouxcolor (Armand and Lucien Roux) "which has created a sensation in the French motion picture industry" and which "amazed" representatives of U. S. film companies. Here is the French version of Rouxcolor:

Termed far more accurate than present color methods and basically no more expensive than black-and-white, the process uses normal camera, processing and projection equipment as well as film. The only modification of present equipment consists of adapters installed between the lenses and the film in both cameras and projectors. Colors and details of the projected image are said to be "far better than the best Hollywood efforts."

Color Separation on B-and-W

The process works on the well-known principle of color separation which, although widely applied in still photography, "never before has been found practical for motion pictures. (Ed.'s NOTE: Comes to mind Thomascolor and other similar processes.^{1, 2} See appended brief description.)

Behind a normal lens the Rouxes install a complicated system of prisms that break up into four identical smaller images which, filtered by four separate filters, represent the primary colors. Instead of one large b-and-w image on the film, the new process has four smaller ones on the same frame—one representing red, the others green, blue and yellow, all in terms of b-and-w film. These four simultaneous pictures are exposed at the same rate as normal b-and-w film.

The film is processed by the same methods as normal b-and-w film, which, as a matter of fact, is just what it is. The projection is the same process as exposure in reverse, with four small b-and-w images being turned back into white-light images, which in turn are "dyed" in their respective colors by filters, mixed by prism attachment and projected on the screen by a normal lens.

Emphasize Roux Simplicity

Asserting that most present color photography methods are unable to cope with the harsh contrasts between light and shadow, the Rouxes aver that their process has all the exposure latitude of b-and-w. Moreover, they claim that old color processes were unusually "slow" and need very fast lenses combined with a great deal of light, while the Roux system is said to be only "slightly slower

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¹ "Thomascolor: Four-Color Process for Motion Pictures"; IP for October 1944, p. 7.

² "The Projection of Thomascolor Motion Pictures," by L. R. Kistler; IP for July, 1945, p. 12.

than film used in normal b-and-w." Rouxcolor can be handled in any b-and-w plant.

Next step, say the Rouxes, will be to establish a U. S. corporation in Los Angeles to handle the process. First production will be on Anscofilm which does not require a special lens system for projection.

Reminiscent of Thomascolor

Rouxcolor is more than slightly reminiscent to many American technicians of the Thomascolor process which utilizes a special camera and a standard projector.

Thomascolor enthusiasts assert that their system makes it possible to photograph four color records simultaneously on a single piece of standard single-emulsion b-and-w film from a single viewpoint in perfect register, absolutely balanced as to color, free from all fringing, entirely without parallax, color beat, ghosting, spherical or color aberration of any kind.

Thomascolor Projection Filter

The process employs an optical system that embodies refraction, partial and total reflection to make four identical color-corrected images simultaneously. A special projector lens attachment causes the light passing through the b-and-w positive film to be filtered and thus colored with the four colors. It is then projected on the screen where the four images are superimposed in full natural color.

No dyes, toning or tinting of any kind are used on either positive or negative, the colors being due entirely to perfect spectral cutoff in making the negative and to projected and superimposed color light in composing the image on the screen.

'Ill-Adapted, Costly'—Kalmus

Additive processes employing a specially adapted camera which uses four prisms with filters, such as Rouxcolor, is "ill-adapted to meet the practical requirements of the motion picture industry due to the limitations in the range lenses that can be used with it," is the opinion of Dr. Herbert Kalmus, president of Technicolor.

Observing that four filters in the projection beam of light would be required, Dr. Kalmus said that this "would mean re-equipping most of the theatres at enormous cost."

Critique of Color Films by Noted British Authority

PENETRATING comment on the prediction frequently made that color films will soon supplant the conventional black-and-white releases, with special emphasis upon the effect of widespread use of color on the over-all economy of the film industry, is made by T. Thorne Baker, noted authority on color processes, in a recent issue of *Kinematograph Weekly*, British trade journal.

"Reasonable perfection in the case of the sound film came fairly quickly; it has been a different story in the case of color," said Dr. Baker. "Several different processes have been tried at the expense of audiences, and it was not until Technicolor's short 'Cucuracha' that experienced researchers felt that color had 'arrived'.

Actual Color Values Misrepresented

"I believe that very few people would go out of their way to see a picture in which they were not interested simply because it is said to have excellent color," continued the British technician. "More likely than not, they enjoy the film because the colors were so subdued that they felt no eyestrain and their attention was not distracted from the story.

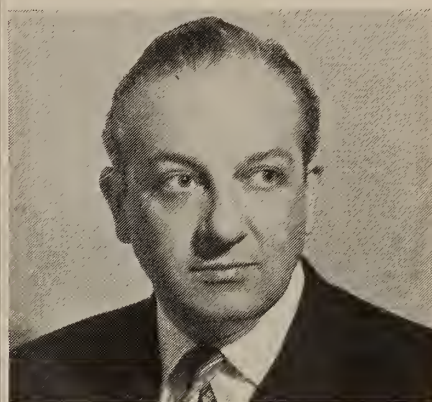
"Those of us who have photographed in America know from the accident of atmosphere that color takes on a very different aspect from what it is here . . . If only color film producers would study the camera obscura, they would realize how very much more diluted and sombre are the actual colors we see and those represented in the average color film.

Technicolor Quality Competition Difficult

"Sets and artists are dressed too much for color, and one wishes that it could just be forgotten that a color film is being made, and let the camera record the normal pic-

ture. All foliage, all textiles, the surface of water—everything, in fact—reflects a good deal of white light from the surface, which dilutes the color and makes it more acceptable to the eye. The eye has to work in order to see, distinguish and differentiate colors, and it is thus more fatiguing to follow a long story in brilliant color than one in monochrome in a comparatively subdued key.


"Assuming, then, that the public is going to have more and more films in color, that they will be improved still further and probably associated with stereophonic and stereo-



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scopic effects in time, the matter of economics may be reviewed.

"The economy of a color picture must always depend on the number of copies to be printed rather than of the cost of negatives. The dye transfer, or wash-off relief process as used in Technicolor is necessarily inexpensive, once the machinery therefor is installed. It is difficult to see how any color matrix system can compete with it or any system depending on silver prints which are converted into dye images.

"An alternative is the triple-coated film, silver emulsions, either containing color formers, which produce in each layer the necessary subtractive image with one single development, or being selectively processed by a somewhat more elaborate technique."

PROJECTION REQUISITES FOR DRIVE-IN THEATRES

(Continued from page 12)

pifiers sufficient to provide $\frac{1}{4}$ watt of power for each in-car speaker. A 600-car capacity drive-in theatre would thus require a sound system with a minimum of 150 watts of power. As emergency power amplifiers can be obtained for but a slightly greater investment, it may prove desirable to select a dual amplifier system. Refunds from a single full show will more than pay for the extra cost.

High-intensity arc amps must of course be utilized. There is a distinct problem,

however, when arc lamps utilizing over 70 amperes are used and that is the probability of heat damage to the film unless a glass filter is located between lamphouse and picture aperture.

Type of Projection Arc Lamps

It appears undesirable for the exhibitor to use high-intensity arc lamps at greater than 70 amperes with a projector not provided with an auxiliary glass filter or a blower. It is perfectly true that a well-designed reflector-arc or condenser-type lamp operating at more than 70 amperes will give more light than arc lamps operating at lesser amperage.

If the excess heat can be eliminated by ventilation, then there is an advantage in using lamps operating at high amperages. If, however, it is necessary to use a glass filter between lamp and projector, then there is no advantage in trying to get extra illumination by using arc lamps burning in excess of 70 amperes. The use of various filters causes light losses up to 25%, which of course offsets any supposed advantage in the higher currents.*

The selection of the arc lamp power supply is largely a matter of individual preference. Whether the motor generator set or rectifiers are selected, it is important that they have sufficient capacity to operate the arc lamps at maximum amperage.

All of the useful light which reaches the screen from the arc lamps must pass through the projector mechanism, but one of the functions of the shutter is to intermittently cut off the light from the screen so no matter how much light is produced by the arc lamps, all of it cannot possibly reach the screen all of the time.

The projector shutter alternately permits light to fall on one frame of the film for a fraction of a second and then blocks out the light for a fraction of a second while the next picture is brought into place. The shutter is absolutely necessary, for without it the series of pictures on the film would contain numerous disconcerting streaks of light. The alternate light and dark periods permit each picture to stand out on the screen clearly.

Double-Shutter Projectors

Motiograph, like other leading American projector manufacturers today, urgently recommends double-shutter mechanisms over single-shutter models, because the former permit light to reach the screen for a longer period than will single-shutter mechanisms.

The single-disc type shutter has two blades of equal size, one of which, known

* "Study of Radiant Energy at Motion Picture Film Aperture," by R. J. Zavesky, M. R. Null, and W. W. Lozier; Journal of the S.M.P.E., August, 1945, p. 102.



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as the master blade, cuts off the light from the screen during the period in which the intermittent movement is pulling the film into place at the aperture. The second blade, known as the balancing or flicker blade, is located at the opposite diameter from the master blade and covers the aperture for a short period of time while the film is at rest so as to double the light interruption frequency and thus make the flicker more nearly tolerable.

When double-shutter mechanisms are employed, there are usually two master blades and two balancing blades, with the two master blades cutting the light beam at the same time from opposite directions. Hence, as the time to cut the light off the screen and restore it is reduced by one-half as compared with the single shutter, the screen receives a proportionately increased illumination.

It should be apparent from the foregoing that best screen illumination can be accomplished by the combination of the correct arc lamps, power supply, coated lenses and a double-shutter projector mechanism.

THE BALLAST RHEOSTAT

(Continued from page 21)

the use of ballast resistances. By making use of a series circuit similar to the one described for f-v generators, one rectifier can be made to supply two arc lamps; but this practice is not recommended. There should be one rectifier for each lamp. (Two rectifiers, each having its own output terminals, are often housed in a single cabinet.)

Let us now return to the c-v generator, which is specifically designed to supply

several arc lamps connected in parallel. It has been pointed out that ballast must be inserted in each arc-lamp circuit to insure smooth operation of the arc.

Figure 2 shows the complete approved hookup for two arc lamps. In this drawing a generator-output voltmeter, two ammeters (one for each arc circuit), adjustable ballast rheostats, arc-lamp switches, fuses, and a generator field rheostat have been included. The basic circuit for each lamp is, however, the same as the simplified circuit shown in Fig. 1.

It does not matter which side of an arc circuit is chosen for insertion of the ballast, *but the same side should be used for all arcs.* In Figs. 1 and 2 the ballast rheostats are inserted in the negative leads. An arc-lamp circuit is a "floating" circuit—that is, neither side is grounded.

The function of a ballast rheostat is two-fold. The obvious function is to absorb excessive current surges when an arc is struck and so prevent short-circuiting the generator and blowing the fuses. The arc-stabilizing action is not so easy to understand.

Most devices or units found in d-c circuits have a fairly constant coefficient of resistance. The precise degree of resistivity may change with a change of temperature (which is often occasioned by a change of current) but on the whole the changes are very slight, and calculations made on the basis of Ohm's law are accurate throughout a wide range of current and voltage. The resistivity of the electric arc, like that of other gaseous discharges, is an entirely different matter.

If an arc is directly connected to a source of constant voltage, its ohmic re-

sistance will decrease alarmingly until it is passing all the current that the source is capable of supplying, or as much as the wires and carbons will stand.

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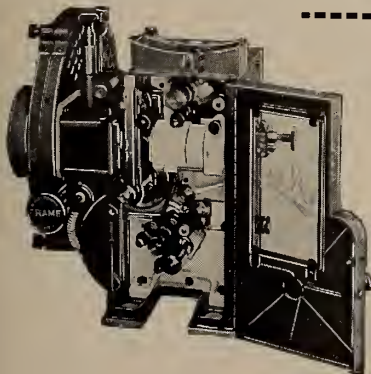
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quently state that the voltage-drop across an arc operated without ballast steadily decreases as the resistance decreases. This is not necessarily true. The internal impedance characteristics and overload point of the current source determine the behavior of an arc operated without ballast.

If the current source were a c-v machine of such vast power capacity that its internal impedance should remain negligible at all times, and if the connecting wires were perfect conductors, the voltage-drop across the arc would remain constant. The available current, however, would be unlimited and as the arc resistance continued to decrease, the amperage would climb to prodigious proportions. The net result: the carbons would soon flame along their entire length and be consumed furiously.

This is admittedly an impossible state of affairs, but it will serve to indicate the tendencies of a carbon arc connected directly to the terminals of a powerful c-v source.

Even though the power capacity of a projection arc generator is sufficiently great to meet all normal demands, it is nevertheless not infinitely great. Any generator has an overload point, and this point usually lies considerably above the rated "overload" amperage of the machine.

When the actual overload point of a c-v generator has been reached (that is, when the "back electromotive force" through the armature is sufficiently strong to demagnetize the shunt field) the generation of voltage drops off quickly. When this occurs the arc will very likely snap out. If the drop-off is gradual, the increased resistance of the arc will cause the current to fall below the overload point, and the voltage will slowly be regained.

The resulting large fluctuations of power overload the carbons one moment, causing sputtering, and underload them the next. It is impossible to maintain a good arc crater when such conditions prevail.

Stabilizing Action of Ballast

Needless to say, an overloaded generator is in grave danger of being damaged by excessive heating of the armature and field windings. If the fuses have sufficiently low current-carrying capacity to protect the circuit effectively, they will "blow" long before the danger point is reached.

Because the resistance of a carbon arc decreases as the current increases, it can readily be appreciated that some sort of power-regulating device is necessary. The ballast rheostat is such a device.

When electricity passes through a resistance, the voltage-drop across the

resistance is directly proportional to the current (amperes) flowing—the greater the current, the greater the voltage absorbed by the resistance.

The voltage supplied to a ballast-stabilized arc (arc-drop) is the voltage absorbed by the ballast *subtracted* from the generator voltage. The generator voltage is constant, but the ballast voltage-drop varies with the current flowing through the circuit.

When the arc resistance decreases, permitting more current to flow, the ballast absorbs more voltage. The current at once decreases. This causes the resistance of the arc to increase, decreasing the current still more. But the ballast then absorbs less voltage, and the current begins to increase again. Soon a balance is reached and all variations in arc current are smoothed out.

Minimum Allowable Arc Ballast

It is proper to speak of an arc having a resistance of "so many ohms" only if we specify a stabilized arc. (Methods of measuring arc resistance were given in the first installment of IP's "Complete Projection Data Charts.")¹ A low-intensity arc burning at 55 volts and passing 32 amps (13-mm cored positive, 9-mm cored negative) has a resistance of 1.72 ohms. A high-intensity arc burning at 35 volts and drawing 46 amps (7-mm Suprex positive, 6-mm Orotip negative) has a resistance of 0.76 ohm.

There is a minimum permissible value of ballast resistance for each type of arc. For low-intensity arcs the ballast should

¹ IP for April, 1947, p. 19 et seq.



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be at least 0.455 times the arc-drop in volts divided by the current in amperes. (In the following useful formula $r_{b,L.I.}$ is the minimum allowable value for the low-intensity arc ballast in ohms, E_a is the arc-drop, and I is the current):

$$r_{b,L.I.} = 0.455 \frac{E_a}{I}$$

By means of this expression it can be calculated that a 32-amp, 55-volt low-intensity arc requires a ballast of at least 0.78 ohm. Now the generator supplying such an arc through a 0.78-ohm ballast must have a c-v output of at least 80 volts. (Let e_g represent the minimum permissible voltage output of the generator and r_b the minimum ohmic value of the ballast):

$$e_g = I \left(\frac{E_a}{I} + r_b \right)$$

If the generator output is greater than 80 volts, additional ballast must be inserted to cut down the voltage to that required at the arc. (Carbons should never be overloaded if a quietly burning arc is desired!)

$$R_b = \frac{E_g - E_a}{I}$$

In the foregoing formula R_b is the required ballast resistance in ohms, E_g is the known generator voltage, and E_a is the correct arc-drop for the carbons being used.

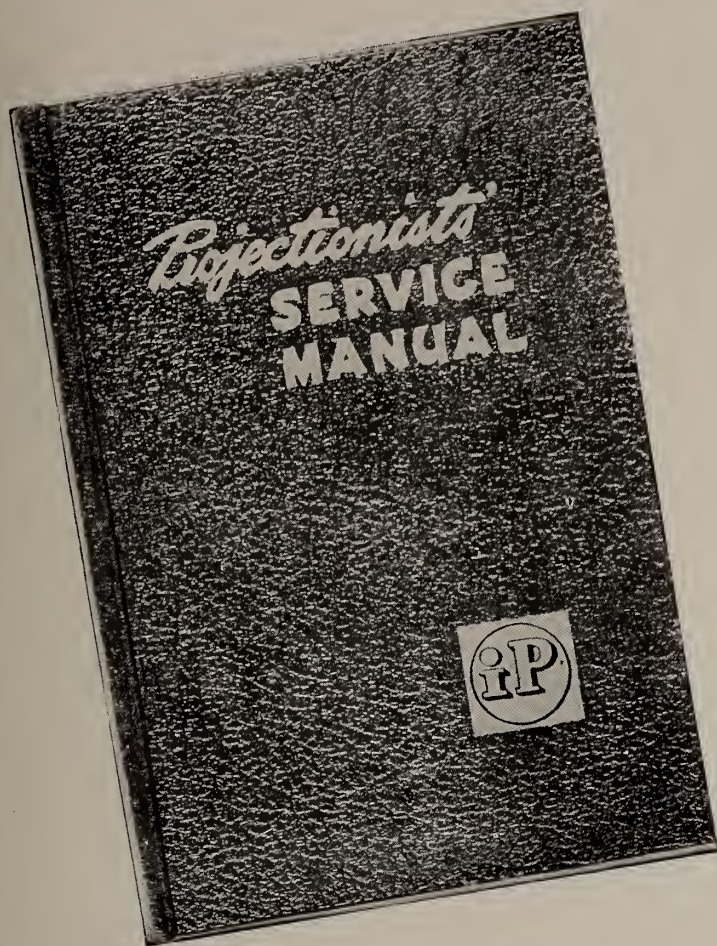
In the case of a non-rotating, high-intensity arc the ballast should be at least 0.286 times the arc-drop in volts divided by the current in amperes. (Let the minimum allowable value for the non-rotating, high-intensity arc ballast in ohms be represented by $r_{b,H.I.}$):

$$r_{b,H.I.} = 0.286 \frac{E_a}{I}$$

A 46-amp, 35-volt, high-intensity arc therefore requires a ballast of at least 0.22 ohm. The generator supplying this arc through a 0.22-ohm ballast must have a c-v output of at least 45 volts.

It can at once be seen that the ballast voltage-drop for the 32-amp, low-intensity arc is 25 volts, while the ballast drop for the 46-amp, high-intensity arc is 10 volts. The requirements are less critical for high-intensity than for low-intensity arcs. The latter have a more pronounced tendency to "slop over" into a state of overload sputtering.

Whatever the type of lamp, the projectionist should not forget that using anything less than the recommended minimum values of ballast resistance will create operating difficulties. Fine adjustments of current should be made with the generator field rheostat, not with the arc ballasts.



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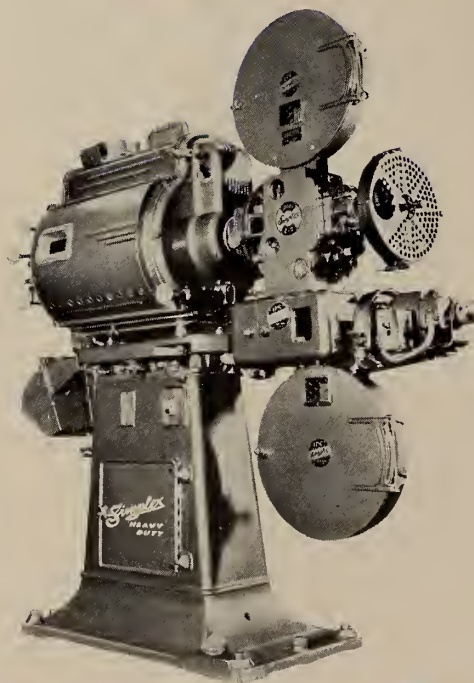
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HENRY B. SELLWOOD, *Editor*

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JULY 1948

Number 7

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MONTHLY CHAT

MANY years ago a noted writer characterized a divorce court as a temple where liars go to pray. We neither endorse nor challenge the accuracy of this observation; we merely wish to expand it to include certain merchandisers of projection equipment, the pseudo-inventors, and the so-called trade papers in general, particularly in those sections purporting to deal with technical matters.

These sections are akin to a secluded sylvan dell where the weather is always perfect, wherein one is never buffeted by storms of controversy or even disturbed by the gentle breezes of a well-mannered exchange of ideas. But to one who throws off the narcosis of serenity and discards his rose-colored glasses all is bedlam, induced by a disbelief that any rational person could concoct or digest the mass of incredibly fantastic assertions which are born of a desperate effort to merchandise a given product or to gain support for a given theory.

Several times each year IP encounters such protagonists of either merchandise or theories, by means of either a personal call or through the mails. The approach pattern is invariably the same:

If the petitioner be selling equipment, he will skip blithely from claims of perfection for his own equipment to actual slander of a competitor's product. If he be a pseudo-inventor or just a fanatic who gets a vicarious belt out of seeing his name in print or from having fathered a wild notion the result of years of irrational brooding, he will produce clippings, letters and assorted memorabilia dating back umpty-umpty years to prove that only the treachery of some unnamed person, under some undisclosed circumstances, at some unremembered place and date prevented "justice being done."

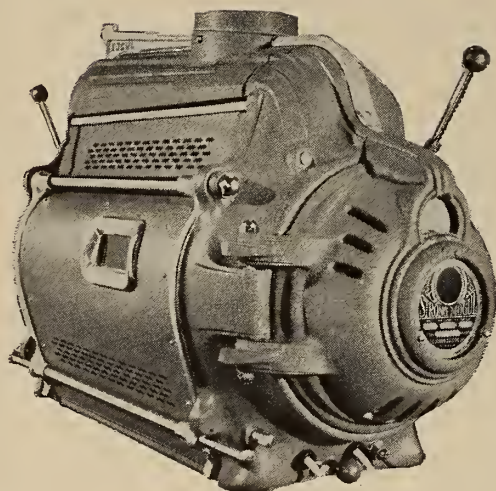
If IP just can't go along with the idea being peddled, the reactions of both manufacturer and idea-man are basically the same, although taking different forms: the man of commerce is blustery, sometimes threatening and altogether disagreeable; the starry-eyed one is gripped by frustration and saddened that IP should fail to recognize an "historic moment."

A case in point: a certain manufacturer recently desired to spread upon the record via IP a mass of "intelligence" consisting of extravagant claims relating to his product and some pretty stiff stuff in the way of comparative statements thrown at his competitors.

At the very best, the claims made for the product were highly questionable; while the comparative stuff was utterly impossible. When asked the source of his claims, the manufacturer replied that they stemmed from "private tests." Could we see the data, or at least be acquainted with the conditions under which the tests

(Continued on page 30)

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Control of Sound-Film Reproduction

OF THE many factors entering into the projection process, control and adjustment of the sound system requires the greatest sense of showmanship on the part of the projectionist. Factors involved in the visual projection—screen illumination, focus, *etc.*—are interpreted by nearly everyone in nearly the same way; but not so with sound. The best that can be done is to please the majority and sympathize with the dissatisfied and vociferous minority.

The exhibitor who continually demands a reduction of sound volume on dramatic music and during action scenes fails to appreciate that the function of the projection process is to create an *illusion of reality* in sight and sound and to *arouse the emotions* of the audience. The wide volume range of modern sound tracks goes for naught in his theatre, and while the sound reproduction may possibly be *intelligible*, it is far from being *natural* or dramatically effective.

An interesting approach to the psychological aspect of sound reproduction in the theatre is provided by a brief glance at the problems confronting the pioneers of sound pictures in the transition period between the "silent" and "sound" eras.

Psychological Effect of Sound

"Before the advent of sound," wrote Wesley C. Miller 17 years ago,¹ "the motion picture art had reached the point where a great portion of its tremendous appeal came from the fluidity of motion of the action. The ability to cut from place to place, to

By ROBERT A. MITCHELL

recognize no limits of time or space, had made it possible to play upon the imagination of the audience to the point where they were almost *in* the scenes depicted before them on the screen.

"This, done with suitable music, left their minds undisturbed by anything but the picture, which, if at all good, could completely carry them away. Along with it all, however, it was still quite possible to talk or move around without losing enough of the sense of the picture to make it uninteresting.

"Sound immediately introduced a complication which is largely psychological. If much of the story is told by the spoken dialogue, it becomes practically imperative to maintain silence and to pay strict attention to every word. This demands concentration to a degree which is not often relished by an audience which demands a method of recreation permitting more relaxation."

This was written prior to wide-range

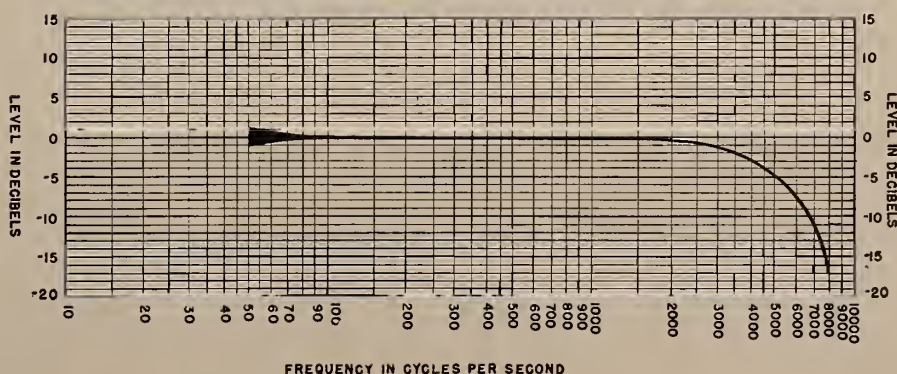
methods of recording. Early attempts at sound were anything but pleasing. Surface noise was excessive and the sound was weak and distorted.

It was quickly learned that sound pictures, unlike the silents, could not rely on the obvious artifices of exaggerated acting, tinted film, and continuous mood music to create an illusion of reality in the *imagination* of the audience. Ever since "The Jazz Singer" in 1927, theatre patrons have expected to see and hear everything in *perfect naturalness*. But for ten years the articulate screen spoke only in thin whispers. Music, normal dialogue and all special sound effects were recorded and reproduced at approximately the same level.

True Volume Range Span

In 1937 "Hi-Range" and "Noiseless" recordings were developed by "biasing" the sound tracks. The biased sound track depends for its effectiveness on admitting no more light to the photo-

Academy-recommended response of the overall soundhead and amplifier system.



¹"The Illusion of Reality in Sound Pictures" by Wesley C. Miller, Chief Sound Engineer, M-G-M Studios. Reprinted with other Academy papers on sound in *Recording Sound for Motion Pictures*, McGraw-Hill, 1931.

electric cell than is required by the intensity of the sound at any moment. A minimum of exciting light is transmitted during intervals of silence.

By cutting surface noise down to a very low level, modern sound-on-film recording makes possible a large increase in volume range, *for the volume range of any recording is the region between surface-noise level and 100% modulation, the point where overload begins.*

Still further improvements in sound recording are pending. Not only will the volume range be extended, but the directional quality of individual sounds will be simulated by control-track recording and stereophonic reproduction. All these new developments are intended to increase the element of naturalness in motion pictures and thus bring the illusion of reality.

Prevailing practices in theatre sound control, however, indicate that exhibitors still need to be convinced that the public expects a full range in sound reproduction. Until exhibitor resistance to natural sound is overcome, the widespread use of stereophonic systems will be delayed and the commercial motion picture will become increasingly vulnerable to such competitors in the visual entertainment field as television and 16-mm showings in the home.

Despite the fact that modern sound-film recording has a range of 50 decibels—20 db over old-style recording—many projectionists, at the unceasing insistence of managers, “ride the gain” in an effort to counteract changes in volume which have intentionally been recorded on the film! “Whispering screens” will do nothing to decrease the popularity of home television.

Narrow Range Not Effective

It is difficult to understand the point of view of those managers who would restrict sound volume to the narrowest possible range. It may be that these prosaic individuals have been “conditioned” by the restricted-range recording of former years. Many managers are also prone to suspect that something is wrong with the projection process whenever the sound level rises above or falls below an average level.

A case in point is the manager who demands an *increase* in volume during hushed moments of screen suspense. The sudden explosion of excessively loud sound which follows the quiet interval is incompatible with artistic standards and never fails to breed audience indignation.

Equally ruinous to the proper presentation of a picture is the rather common practice of lowering the volume on title music, especially when the music is intentionally recorded at high level to presage portentous events in the drama about to unfold. The projectionist can determine the proper volume level from

the character of the music, and he will know that this volume is necessary if dialogue is to be reproduced loudly enough to be heard without strain by the majority of the audience.

Modern recording practice *intentionally* reduces the modulation of dialogue in order that dramatic music and sound effects may have the advantage of adequate volume. Projectionists who are annoyed by the frequent receipt of the familiar two-buzz signal from the auditorium whenever musical sequences are playing should bring this extremely important fact to the attention of the management.

Changes in the volume-control, or attenuator, setting while a picture is in progress are sometimes necessary for one reason or another, of course. In the opinion of the writer, however, the projectionist's responsibility for maintaining correct volume actually goes no farther than to maintain, as nearly as possible, an optimum level determined by a *competent* sound observer in the auditorium, and to point out to that observer the artistic desirability of utilizing the full range of modern recording.

The manager who rings for lower volume merely because the sounds of a battle scene interfere with his social activities in the foyer is *not* a competent sound observer.

Projectionist Control Limited

Indeed, in rare instances the projectionist may enhance the effectiveness of spectacular scenes by manually boosting the gain. Explosions, flood and earthquake noises, and prolonged gunfire without dialogue are among the sounds that lend themselves to this treatment.

Perfect volume control by the projec-

Sure No Countee—Weighee

IP is indebted to that enterprising British trade journal, *Ideal Kinema*, for the appended imperishable contribution to projection lore:

Have just arrived at a place called Dyalawa, some 6500 feet above sea level, on a short visit to a camp here. I visited the local “cinema” and naturally headed straight for the projection room (??).

My curiosity was aroused when I noticed that the projectionist, after opening each reel container, put the reel on a scale. Asking the reason for this incomprehensible procedure, I was informed blandly that “four pounds of film ran for 10 minutes.”

The projectionist (?) further informed me that my method of calculating 11 minutes running time for each 1000 feet of film was too complicated. He added that when a reel weighs 4 pounds, 3 ounces, he knocks off 3 ounces to allow for oil which makes the reel “heavy”!

K. C. JOHNSON
RAF Station, Negombo, Ceylon

tionist alone is rendered nearly impossible by the unavoidable noise of the projectors and by his isolation from the varying acoustic conditions of the auditorium. As a general rule, the volume required increases with the size of the audience, the occurrence of laughter and its duration, the noisy reaction of children to action scenes, *etc.* The value of an auxiliary volume control for use by a sound observer in the auditorium can readily be appreciated.

A fluctuating amplifier output is frequently a source of much annoyance. The projectionist may blame the power or the prints, and he is often correct. Whenever mysterious variations in sound output are detected, the line voltmeter should be watched closely for several days. If the voltage fluctuations are not pronounced, or if the sound fluctuations appear to be more or less independent of the voltage, some part of the amplifier is probably overloaded.

A grid resistor or condenser may be partially “shorted,” or the polarizing voltage supplied to the photocells may be too high. The variations in volume may sometimes be remedied by reducing the line voltage supplied to the amplifier, but this is only an emergency measure and it should not be resorted to if the resulting reduced filament current causes the sound to become “mushy”.

A permanent “cure” of the trouble is effected by the sound service engineer, and for the purpose of assisting that indispensable specialist, the projectionist should study the condition carefully from the moment he first notices it. By doing this, much time may be saved, for the soundman appreciates data supplied by the projectionist. Close cooperation of projectionist and service engineer is distinctly to the advantage of any theatre.

Unsatisfactory volume level may usually be rectified by a simple twist of the attenuator knob; but poor sound quality must be endured until the cause is located and corrected, a laborious process in many cases. Poor sound utterly destroys the desired illusion of reality, and it nearly always affects the box-office adversely.

Teamwork With Serviceman

Correction of inferior quality is a job for the service engineer. It is the projectionist's duty to keep the soundheads and amplifier units clean and in good mechanical condition, but it is unfair to expect him to assume the additional burden of servicing the sound system, even though he may possess all the specialized knowledge and great skill required.

Adjustment of the soundhead optical units decidedly belongs in the province of the soundman. The fact that a projectionist may be competent to make this adjustment is beside the point. Only in

cases of dire necessity should the projectionist remove this unit or attempt to improve the focus of the scanning beam.

Adjustment of the standard type of optical unit is extremely critical and requires a high degree of judgment. A rotational adjustment is provided for horizontal positioning of the scanning beam, and a focusing arrangement permits the optical tube to be moved toward or away from the film. It should be remembered that a perfect focus cannot be secured without the use of high-frequency test film and an output meter. For emergency purposes, however, the following "flicker test" may be used.

1. Thread the soundhead with a short length of 9,000-cycle test film.

2. Place a white card between the film and the photocell lens or mirror.

3. With the exciting lamp on, turn the projector *very* slowly by hand and observe the flickering spot of light on the card.

4. If bands of shadow move downward on the card, the optical tube is too far from the film. If the bands move upward, the optical tube is too close to the film. If no bands are seen on the card, but only a uniformly flickering spot of light, the optical unit is properly focused.

The projectionist should bear in mind that the flicker test is not capable of indicating either improper rotational adjustment of the optical tube or misalignment of the lateral guide rollers. Also, this test is not made under the conditions of tension of normally running film, hence there may be a slight error. These limitations of the flicker test should be brought to the attention of exhibitors who may urge their projectionists to use it in the hope that a few pennies may be saved at the expense of *both* projectionist and service engineer.

A Few Tips on Adjustments

To make the rotational adjustment an output meter *must* be used. Adjustment of the lateral guide roller end stop is accomplished with the aid of buzz-track test film.²

Exciting lamp adjustments are easily made and are well known to all projectionists. What apparently is *not* well known is the fact that excitors should be replaced before the glass envelope blackens considerably.

It is very important to follow up optical unit and exciter adjustments with an output-matching of the projectors. The means provided for raising or lowering the output of a projector depends on the make and type of the sound equipment. Deliberately throwing the exciter out of focus or masking off part of the

Background of American Trade Unions

By JOHN P. FREY

President, Metal Trades Department, American Federation of Labor

XVI. Conclusion: Partisan Political Activity by Labor

IT IS now almost 12 years since the CIO was organized, its growth being due largely to the active support given to it by individuals prominent in the national administration. During the same period the membership of the AFL has increased tremendously. The Federation's dues-paying membership is now almost 7 million as shown by the regularly published financial reports. The CIO claims almost as many members but refrains from publishing official financial reports showing per capita being paid. It may not be an unfair estimate to place the dues-paying members of the CIO at about half the number now gathered within the Federation.

Politically, the CIO entered the partisan field from the beginning. It organized the so-called Labor's Non-Partisan League. The name was carefully chosen to disguise the organization's definitely partisan political character.

The 1938 Legislator 'Purge'

The CIO's first far-reaching political effort was in 1938 when the administration endeavored to purge nine Democratic senators and one congressman, O'Connor of New York, chairman of the House Rules Committee. The purging of congressmen was left to Labor's Non-Partisan League, which placed 39 upon its to-be-eliminated list, in addition to the nine senators.

When the ballots were counted on Election Day, it was found that each of the senators had been reelected, while only two of the congressmen had been defeated—O'Connor of New York, and William J. Driver of Arkansas, who had lined up on the wrong side of Town-

sendism in his district. Time alone will indicate whether history will repeat itself and defeat the effort to win over American labor in large numbers to the support of a partisan political policy.

This presentation has been prepared to outline the beginnings of craft unionism and its development in civilizations of ancient times, its growth during the medieval period and its inception and progress in America. It is not intended to be a controversial examination of the various movements organized to establish industrial unionism, or give a detailed account of the elements which combined to build up the CIO, or the extraordinary application of discretionary authority vested in many federal agencies having to do with industrial relations.

The history of the CIO is a separate undertaking, not properly coming within the scope of this presentation. This is equally true of the part which has been played by the National Labor Relations Board and the national administration. The purpose of this treatise has been to examine the record for what it tells, rather than to study this for the purpose of forecasting the future.

Craftsman's Political Independence

Thus far through the years American workmen, as a large majority, have been unwilling to forego their political independence and give their devotion to a partisan political policy. In addition, they have refused in large numbers to follow trade union officials who seek to advise them as political leaders.

Experience has taught the lesson that two subjects must be excluded from trade

(Continued on page 29)

photocell lens of a soundhead to reduce output is bad practice.

Sound match, or balance, is tested by running identical frequency test films in both projectors simultaneously and switching back and forth with the fader. The closeness of the match, which should be within ½ db, may be judged by the use of an output meter or by listening. Never in any case should a-c hum or photocell hiss be employed for matching soundheads!

[Ed.'s NOTE: It is interesting to consider Mr. Mitchell's remarks anent extended frequency range reproduction and the psychology of sound in the light first, of the various articles which have appeared in IP on listeners' preferences anent frequency range

and, second, of the article "Psychology of the Sound Film" (IP for May, p. 9), the concluding installment of which appears elsewhere herein.

About ten years ago a survey conducted by a group of radio set manufacturers proved conclusively that a great majority of listeners preferred the restricted frequency range which was marked by predominantly "bassy" tones. Every present indication is that as improved equipment enabled better reproduction the listening public, however slowly, developed a keener appreciation of and a pronounced preference for the extended frequency range.

This circumstance is of particular importance to the projectionist in that it imposes ever more severe demands on his talents to the end that sound reproduction may be held to a high quality level.]

² See "SMPE-Academy Test Reels" in IP for February, 1948, p. 6.

New Century Sound Systems Feature Fundamental Reproducer Advances

DEVELOPMENT of two new sound amplification systems has recently been completed by Century Projector Corp., and these, together with the Century Master and Standard reproducers give a selection of four distinctive and different sound systems, anyone of which may be obtained in power ratings from 15 to 500 watts.

These reproducers incorporate fundamental improvements in film drives which result in better film motion, reduced flutter problems, simplified film threading and equipment adjustments.

The improved film drive filter mechanism is a new and novel development by C. C. Davis of the Electrical Research Products Division of Western Electric Co. It was adopted by Century for the foundation of these new reproducers. The development received recognition from the Academy of Motion Picture Arts and Sciences in an award (Class II, Plaque) for the year 1947 as follows:

Academy Award Citation

"This mechanism is a fundamental improvement in film drive, resulting in better film motion in any type of studio sound recording and studio or theatre sound reproducing equipment. It has reduced flutter problems, simplified film threading and equipment adjustments, and requires no critical manufacturing tolerances.

"As this device is suitable to theatre as well as studio equipment, its application has a definite influence on the industry as it results in improved quality in the theatre."

The device for which the award was granted differs considerably in many respects from earlier mechanisms. The flywheel is driven by deliberately tensioned film with oil damping applied to the tensioning device. The advantages of this arrangement include provision of optimum bearing conditions of rotational parts, while applying damping to a non-

rotating element. In addition, the extent of damping is little affected by varying quality or buckled condition of the film, as firm contact is established between the film and the drum.

In operation, the film is deflected from a straight path between the drum and sound sprocket by a spring-tensioned idler arm and roller with which the damper is associated. Any tendency to flutter which may be induced in the film by the driving sprocket is passed to the compliant, oil-damped arm, rather than appearing as irregular motion of the flywheel.

Four Good Design Fundamentals

This combination fulfills four desirable requirements for good design:

- (a) Optimum bearing conditions of rotational parts.
- (b) Application of damping to a non-rotating element.
- (c) A value of compliance largely independent of the varying quality or bent condition of the film.
- (d) Firm contact between film and scanner drum.

The compliance element or pliability introduced between the driving sprocket and drum has in general been provided by the nature of the film itself in the form of S-shaped loops. This is the type of compliance used in many machines because of its simplicity and is usually referred to as a kinetic scanner or rotary stabilizer. However, it offers no facilities for the introduction of complete damping and control of film motion at the point of scanning.

The tensional path of the film in the new filter, together with the idler arm and roller, constitutes a compliance as in the case of the S-shaped loop, although the two appear considerably different.

Since substantially equal amounts of tension in some form must exist at either side of the translation point, tension must be introduced to offset that of the lower film loop. Two methods have been developed to accomplish this. Fig. 1 shows the single-arm filter used in the Century Master reproducers. Fig. 2 shows the double-arm filter used in the Century Standard reproducers.

The single-arm type shown in Fig. 1 uses a magnetic drag producing a completely free film loop above the scanner. The double arm type shown in Fig. 2 differs from the single-arm type in that the magnetic drag and pressure pad roller are replaced by an idler arm and plain roller similar to that used in the

lower film loop. This makes possible a single unit containing the arms and damper which perform all the functions necessary to drive the drum and flywheel by straight forward belt action.

The loops of a film are tensioned by a differential action, through a single linking or spring. The only reactance opposing flywheel motion is that resulting indirectly from changes in the working angle through which the spring tension is applied to the loops.

The cutoff frequency and the natural oscillatory period of the filter circuit, therefore, are functions of the geometry of the arms and loops and the loading

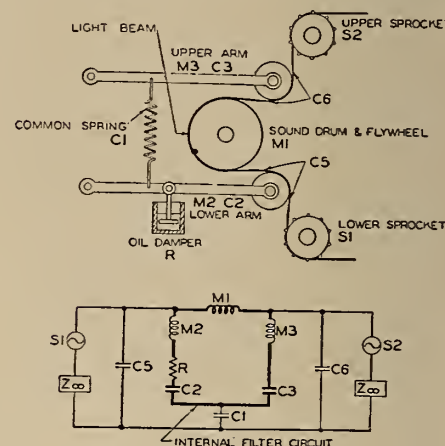


FIG. 2. Double-arm filter.

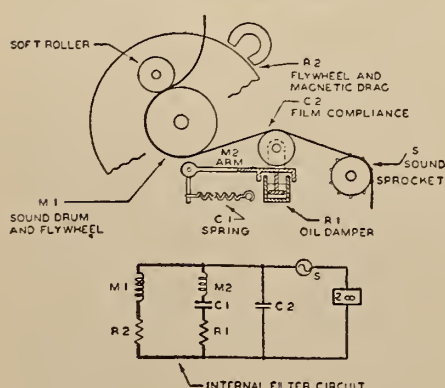
tension of the spring and are not directly a function of the spring constant. This allows for a compact and practical design of the reproducer.

Flutter Suppression Action

The transient response of the single-arm and the double-arm filters is that of a series resonant circuit shown below each schematic in Figs. 1 and 2. They may be computed on the basis of the similar electrical circuits. While increased damping decreases transient response, optimum flutter performance results from an amount of damping determined by recurring disturbances. Disturbances caused by the transient nature of film splices are minimized by the relatively well-damped nature of the circuit and by the fact that there is little change in compliance in the presence of large disturbances.

It is interesting to note that the lower sprocket of the Standard reproducer has practically no load on it, as the film tension of the filter is almost exactly equal and opposite to the tension of the film from the takeup of the lower magazine. In operation, wide divergence from optimum adjustments has little effect on sound reproducing results, and interference from sprocket holes, bent film, gear teeth, etc., has been virtually eliminated.

FIG. 1. Single-arm filter.



How the "Guinea Pig Arc" Builds Bigger Box Office!



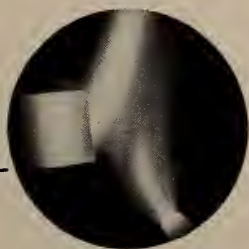
• We put "National" projector carbons in the water-cooled jaws of this special mechanism . . . sock them with king-size jolts of electricity . . . try them at different angles . . . experiment with dozens of sizes and types — and come up with projector carbons that are tailor made for your theatre. The light from "National" carbons is therefore brighter. It is steadier. It is nearly perfect for bringing out the rich tones of color movies.

This experimental arc mechanism is only one detail in National Carbon Company's extensive laboratory effort to develop better projector carbons. You, the exhibitor, reap the benefits in better screen visibility, satisfied patrons, and bigger box office!

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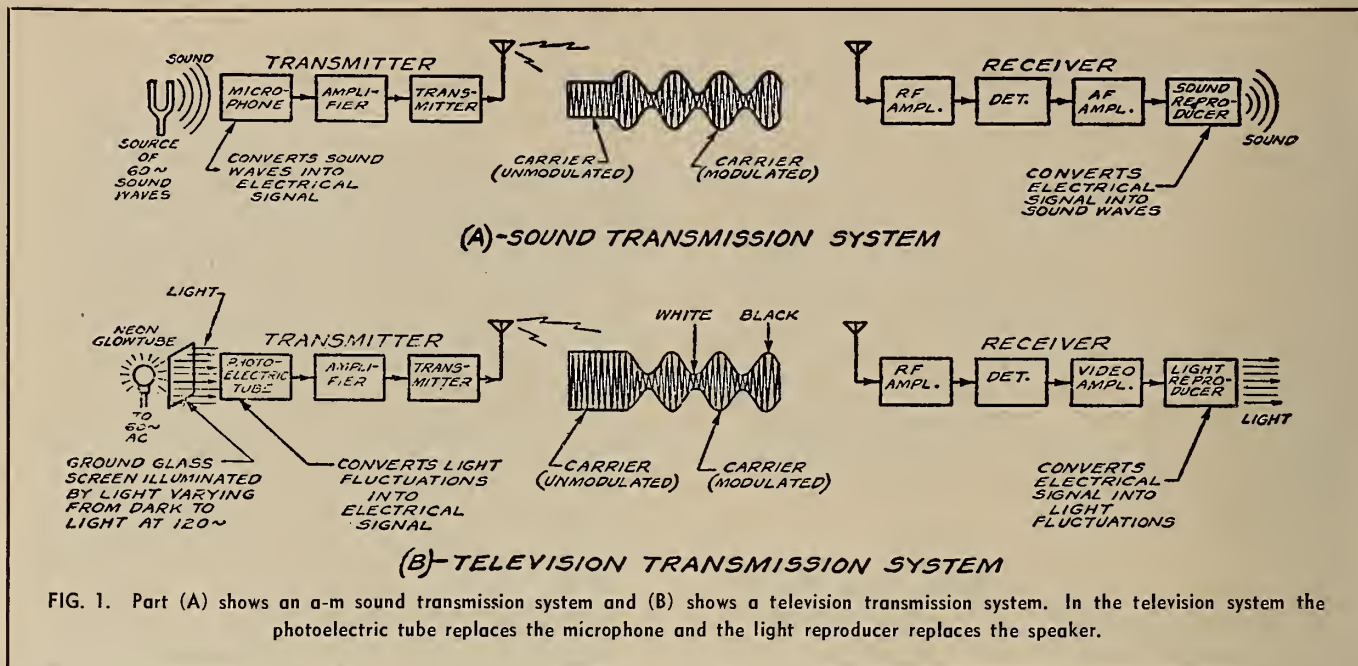


FIG. 1. Part (A) shows an a-m sound transmission system and (B) shows a television transmission system. In the television system the photoelectric tube replaces the microphone and the light reproducer replaces the speaker.

TELEVISION: How it Works

By WILLIAM BOUIE

JUST as it is the problem of radio broadcasting to recreate sound at places distant from the actual sound, so it is the problem of television (Tv) to recreate a scene at places distant from the original scene. In the case of amplitude modulated (a-m) sound broadcasting, as Fig. 1 (A) shows, sound vibrations are picked up by a microphone which converts these vibrations into corresponding electrical vibrations.

This electrical signal, which now carries an electrical image of the sound vibrations, is amplified and, finally, the electrical impulses (similar in shape to those which were originally produced by the microphone) are used to actuate the speaker which in turn recreates the original sound.

Figure 1 (B) shows that a system very similar to this is used in Tv and that in general a very close resemblance exists between sound broadcasting and Tv.

To simplify the explanation, we assume that only a very small part or element of a scene is being televised. For example, we might allow the light from a neon tube operated from the 60-cycle power line to fall on a small piece of ground glass. The illumination

on the ground glass would change from dark through various shades of brightness and back again to dark, and repeat this cycle 120 times per second. (Note that the rate is 120 cycles because both positive and negative cycles cause the neon tube to illuminate the screen.)

Microphone and Camera Analogy

In the same way that sound broadcasting uses a microphone to convert the sound pressure variations into electrical variations, so the heart of any Tv broadcasting system is the camera which converts the time variations in illumination of the scene into corresponding electrical variations. In the simple illustration chosen, because only a single small area is being televised, an ordinary photoelectric cell can serve as the Tv camera.

Once the varying light values have been changed into corresponding electrical values by the Tv camera, the process of transmitting the information follows exactly the same procedure as in the case of sound broadcasting. Note that the carrier is modulated in the same way and that it remains stationary in

amplitude during the period before the screen is illuminated.

Once the neon tube is turned on and illuminates the screen, the amplitude of the carrier varies in proportion to the amount of illumination. Note that the maximum amplitude of the carrier corresponds to a black image, and that the image gets progressively lighter as the amplitude of the carrier is decreased. This is called *negative modulation*, about which we shall say more later on.

For the present, the important thing to note is the similarity between the two systems, the one for transmitting information on light values, the other for transmitting information on sound values. At the output of the Tv receiver, we of course have important change. Whereas the output of the sound receiver is a speaker which converts the electrical impulses into corresponding sound impulses, the output of the Tv receiver is a "picture tube" or other device which converts the electrical impulses into corresponding light values.

We see then, that the a-m sound system and the Tv system are identical, with the exception that the Tv camera is substituted for the microphone and the

Current developments make it imperative that all projectionists have a working knowledge of television. Particularly suitable for conveying this information is a series of articles, beginning here, which will cover the fundamentals

of the art, particularly in terms of image propagation and reception. This series, incidentally, constitutes only one chapter in "Television: How It Works," just published by John F. Rider, and which is reviewed elsewhere in this issue.

picture tube for the loudspeaker. We might also mention here that in the RCA system, the trade-mark name "Iconoscope" is used for the Tv camera tube and the trademark name "Kinescope" for the picture tube.

The Iconoscope consists of a very large number of minute photo-electric cells which create an electrical picture of the scene being televised, while the Kinescope consists of a cathode-ray tube on the screen of which is built up a visible image.

Multiplicity of Minute Points

Obviously, in comparing Tv with a-m sound broadcasting we limited ourselves to televising the simplest type of object, one which was uniformly illuminated over its entire area. We then showed that the two systems are identical provided that the Tv camera replaces the microphone and the picture tube replaces the loudspeaker.

Unfortunately, however, Tv is not as simple as this or it would have "arrived" many years ago. In Tv we are confronted with the problem of conveying information on the light value not at *one point* but at *every point* over the complete area of the scene being televised. Thus, the scene must be broken up into a great many elements or elemental areas which must be conveyed to the receiver and finally to the picture tube. And not only must this information be conveyed, but it must be reassembled in the correct order at the receiver and the corresponding light value reproduced for every one of the many elements into which the image has been broken down.

As a matter of fact, this process of breaking down a picture into a great number of elements is nothing new but is as old and as fundamental as the process of seeing itself. For, in viewing a scene, image is carried to the brain by the eye over a huge network of transmission lines which tells the brain the intensity and the color of light at every point in the field of vision.

Because the number of elements into which the retina of the eye breaks down the scene is so great, we are not conscious that the picture is made up in this way

FIG. 3.

The same detail as is apparent in Fig. 2 can be obtained by viewing this enlargement from a greater distance.



but receive the impression that the picture is perfectly blended or continuous.

Even ordinary photographs are made up of elementary particles, even though they too appear to be continuous upon casual inspection. Actually, the light and dark parts of a photograph are the result of the presence of black particles of silver which vary in number over the area of the picture. Where the picture is dark, these particles of silver are more numerous than where the picture is light. Because these particles are so small they are not ordinarily visible. We might note in passing that where photographs are to be enlarged appreciably, so-called fine-grain film and special developers are used so that the individual grains or particles will not become visible.

Number of Elements Required

It is important for an understanding of Tv to appreciate how the number of particles or areas into which a picture is broken up affects the type and quality of the reproduction. The quality of the picture will be improved as the number of elements is increased. In order to compare the effect of breaking up a picture into a varying number of elements, consider the two reproductions shown in Fig. 2 (A) and (B). These are reproductions of the same photograph, the only

difference being the number of elements into which the picture is divided.

Examine these figures closely and you will see that they are composed of a large number of black dots of different sizes, and that (B) contains a larger amount of dots than (A). In printing, as well as in the processes of seeing and photography, it is necessary for the picture to be broken down into a series of small areas before it can be printed.

The engraver, in making his halftone, places a fine mesh screen in front of his camera so that the image is broken down into a series of dots, the actual size of any dot depending upon the amount of light on the area which the dot represents. Where the picture is dark, the size of the corresponding dot is large, and where the image is light the size of the black dot is correspondingly small. The number of dots into which Fig. 2 (A) is broken down is 60 per inch; while Fig. 2 (B) is broken down into 120 per inch.

Factors Affecting Elements Total

The great improvement effected by breaking down the picture into a larger number of dots or elements is clearly apparent in the superiority of (B) over (A). Because of the larger number of elements, the former presents more detail, appears finer, better blended and more continuous than the picture with the fewer number of elements.

The actual number of elements into which a picture must be divided depends upon several factors: the fineness of detail which it is desired to reproduce, the distance from which the picture is viewed, and the size of the picture. Fineness of detail, as we have seen, required a large number of elements for a given portion of a scene. In addition, the more closely the picture is viewed, the smaller must be the individual elements. This is necessary so that the individual elements will appear to the eye to merge into



FIG. 2 (left): halftone reproduction of a photo using screen of 60 dots to the inch. (Right): greater detail obtained here by using screen of 120 dots to the inch.



a smooth entity of lines and shades.

If a picture of a given scene is enlarged, either the total number of elements must be increased, or the picture must be viewed from a greater distance. Fig. 2 illustrates the first two factors, fineness of detail and viewing distance. Fig. 3, which shows Fig. 2 *enlarged* to twice its original size, illustrates the third factor. Fig. 2 (B) contains 120 dots per inch; Fig. 3 contains only 60 dots per inch. Each contains the same total number of elements, therefore the fineness of detail is the same in each.

Because Fig. 3 has larger dots, it must be viewed from a greater distance. This consideration is important in Tv, since the total number of lines into which the scene is divided is the same at all times. Therefore, large pictures should be viewed from a greater distance than small ones to get the same effect.

An idea of the number of elements needed to reproduce fine details can be obtained from Fig. 2 (B). This had 120 dots or elements per inch in an area 1.5 by 2 inches, giving $180 \times 240 = 43,200$ total elements, or 14,400 elements per square inch. Tv pictures may be considered to contain about 224,000 elements regardless of picture size. Although this does not work out to be so great a number per square inch on large picture-tube screens, the fact that the scene is usually in motion compensates for some loss of detail.

Scanning Time Factor Vital

A point to remember about Tv is that increasing the number of elements increases the frequency bandwidth which must be transmitted. Thus there are technical and economic limitations to the degree of detail that may be provided.

We can now begin to appreciate the complexity of the problem confronting Tv. For not only must information on

the light value of each one of many thousands of elements be transmitted to the receiver, but also information as to the order or sequence in which these light values must be assembled to form the picture.

To make the problem even more complex, all this information must be transmitted in approximately 1/30th of a second in order to prevent blurring due to movement in the scene and in order to make way for the next picture impression or "frame". In this respect the problem of television is more difficult than that of facsimile, since in the latter a still picture is transmitted and time consumed may be ten minutes or more instead of 1/30th second.

By this time we have seen that to make Tv possible the picture must be broken down into a large number of elements, and information transmitted on the light value at each one of the elements. At the receiver this information is reassembled in the proper space relationship to form the original picture. How to transmit this information is the next problem.

Previously we saw that using a conventional a-m system of radio we could transmit information on the light value at any one element of a scene by using a photoelectric cell pickup to convert the light value to an electrical value, and that this process was essentially the same as that of sound broadcasting and involved essentially the same transmitting and receiving equipment. This was shown and explained in Fig. 1.

The first thought that arises is this: Why not use individual channels of the type shown in Fig. 1 (B) to transmit information on the light values at each one of the points into which the picture is divided? But then, this would require some 100,000 individual pickups and transmission systems each of which would be similar to the system of Fig. 1 (B).

Obviously, such a system would be far too complex and expensive to be practicable, even if other problems of great difficulty at the receiving end do not exist.

Individual Elements Scanned

A more promising solution, used in all Tv systems today, works on the basic idea of transmitting information on the light value of *one element at a time*. In this way the picture is covered or "scanned" in a systematic way until finally the image is said to be completely scanned when information on the light values at every point in the picture has been obtained. The need for more than one channel is thus avoided. However, the information must still be reassembled in the proper order at the receiving end before the picture can be obtained.

Scanning a scene is sometimes compared with the manner in which we read a printed page. For instance as you read this page your eyes start at the upper left-hand corner of the page and successively sweep to the right-hand side while examining every letter on the line. When the first line has been completed, the eye snaps over rapidly to the left-hand side, jumps down one line and in the same way examines every letter on the second line as it progresses at a uniform rate toward the right. This procedure continues until finally the eye reaches the last letter on the lower right-hand side of the page, at which time we can consider that the whole page has been scanned.

This same procedure is used when a Tv camera scans a scene which is to be televised. The only difference is that the Tv camera breaks down the scene into finer elements than the letters of a page and that the camera produces electrical impulses which vary in proportion to the amount of light on each element of the scene being scanned.

The following simple example will help to clarify the fundamental principles and requirements involved in scanning:

Typical Tv Reproduction

Suppose we wish to reproduce by Tv the pattern shown at the left of Fig. 4. Let us assume in this example that a Tv camera (consisting essentially of a photoelectric cell with the proper lens equipment) is available which can be focused so as to pick off the light values on any one of the squares into which the picture has been divided.

Let us also assume that we have a mechanical arrangement for moving the camera both horizontally and vertically so that it will scan the object. That is, it is possible to start with the camera focused on element 1 (Fig. 4) and to move it at a uniform rate across the screen

(Continued on page 24)

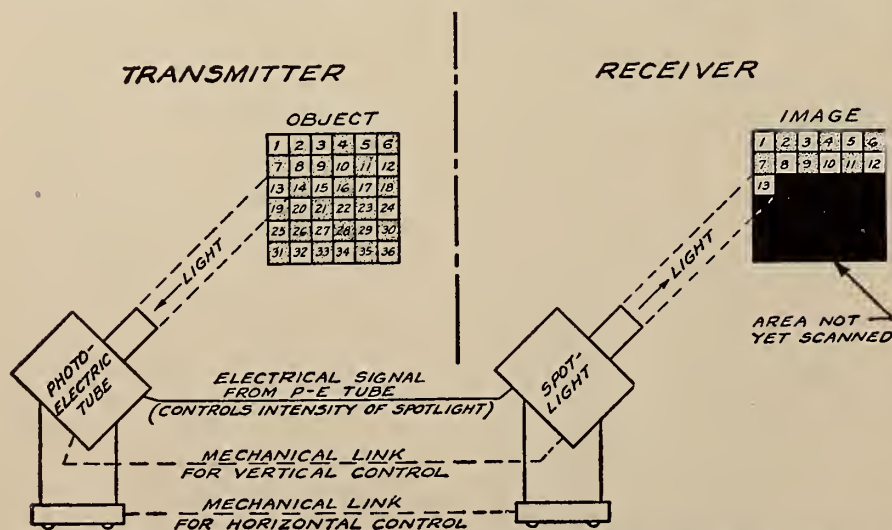


FIG. 4. The photoelectric tube scans the checkerboard pattern in the order indicated by the numbers. The pattern is reproduced at the receiver by means of a spotlight, the motion of which is synchronized with the photoelectric tube and the intensity of which varies in accordance with the amount of light reflected from the square being scanned.



His pen-and-ink people live for laughter...

BORN on the drawing board, though they are, these little people have the breath of life and laughter that captures hearts the world around—thanks to the creative genius of the animator.

His knowing lines belie the fact that they are folk of fantasy... of pen and ink and paint. For each and every one has the human touch... has been fully endowed with character and lifelike move-

ment, through the animator's artistry.

Yet—for all his wit and skill—the animator could not present his gift of laughter to the moviegoing world without the help of film. And this—in types especially adapted to his needs—he finds in the famous Eastman family, whose Fine Grain Master Positive and Background X Negative have been the animator's faithful mediums for many years.



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Psychology of the Sound Film[†]

By L. MERCER FRANCISCO

Francisco Films, Chicago, Illinois

The second and final article on the psychological factors of the sound film and its particular effectiveness for influencing people.

II.

SOUND film sustains attention for other reasons than the physical conditions of screening in a darkened room with extraneous sounds shut out. The medium itself grips the attention through the "flow" of the ideas it presents. It presents visual-action images in a "stream-of-consciousness" manner, requiring virtually no intellectual effort for comprehension.

If the presentation is in the form of a drama unfolding in the words and actions of screen characters with whom the audience can identify themselves readily, then, indeed, the attention is spellbound, for the audience becomes "lost in the story".

Psychologists say that the mind cannot concentrate on any fixed object longer than about seven seconds. In the sound motion picture there is no fixed object; even in the sound slide film, if it be properly conceived, there is a change of picture on the screen about every seven seconds, so the eye simply cannot stray without missing something, and the mind cannot wander.

Clarity in Action, Words

One might, conceivably, be entranced by a continuously moving object and still not understand it. What can be said, therefore, as to the impact of the sound film upon the mind? This: that it makes its idea-content crystal clear, because it presents ideas in visual-action images of the very type which is believed to be involved in thought processes themselves.

The Chinese made this point thousands of years ago and expressed it in what has become a cliché in the field of the graphic arts in "one picture is worth ten thousand words". The great significance of this point in the educational field has recently been brought out in the work of the semanticists. They have discovered that "verbalism" is the most serious defect of our educational methods and they see in the sound film a means of correcting it.

The importance of words should not be underrated, for words, rather than pictures, are the symbols of thought. A film without words is relatively meaningless. In every effective sound film the

idea-content is presented primarily in words and secondarily in pictures; the pictures supplement, complement, define, and clarify the meaning of the words.

But the words of the sound film are *spoken* words. Spoken language is the kind that all of us use every day, all day long, and that all of us hear all the time. They are readily comprehended, assuming they are within the range of our listening if not of our speaking or writing vocabulary. In fusing these two primary factors in clarity—visual-action images and spoken words—the sound film reaches the intellect more readily, with less effort, and more impressively than does any other method of expression.

Emotional Appeal of Sound

People do not, however, think with their minds alone. The behaviorist insists that they also think with their viscera and the neurologist that their endocrine glands are involved. Everyone will admit that people *feel* more than they *think* and that the appeal to the emotions is often of more importance than the appeal to the mind.

The impact of the sound film on the emotions is, if possible, even greater than its impact on the mind. Attitude, or

"mental set," is the determinant of mental activity, and it is the product of the emotions. The recent rapid strides that have been made in scientifically pre-testing the appeal of sound films is based upon measurements of emotional responses, by instruments something similar to the lie-detector.

Probably the most important element in the sound film influencing the emotions is its sound. The effect of sound upon the feelings is most readily appreciated in the field of music. That sound affects the feelings or emotions, while sight appeals to the mind, has always been an accepted fact.

When the history of music is written a generation from now, the contributions which the sound film has made to it will be better appreciated than it is today. Every script writer, even of commercial films, knows what music can do to advance his story and to induce the desired attitude in the film audience. Along with music, of course, is included "sound effects"; they help the sound film, as one writer puts it, to "create the fury as well as the battle, the song as well as the lark".

Dramatic Scenes and 'Empathy'

The impact of the sound film upon the emotions is manifest in other elements, however, as well as in its music and sound effects. The action of screen characters involved in tense, emotional situations induce corresponding emotions in the audience.

The psychologists have a word for this phenomenon of inducing emotions in one individual through portraying emotions in another. It is "empathy". It is your empathic responses which make you almost push your neighbor off his seat at a football game, when your own body leans rigidly in the direction of the line plunge of your own team. It is empathy that makes your muscle tensions follow those of the screen character in the dramatic portrayal.

So strong is the appeal of the sound film, through both its sound and its visual-action images, to the emotions, that it often is the equal of real-life experience itself in intensity. Indeed, there are films in which the screen-presented story seems even more real than real life!

Imagine what that means in propaganda, selling, public relations, education, and training. It means that, with the sound film, you can groove or condition the nervous systems of people in a directed, controlled manner, almost as well as experience itself!

You can provide them with vicarious experience in the form of muscle tensions, nervous responses, blood pressure, respiration and all the activities of the sympathetic nervous system by controlling

Sound Film Running Time

Projection period	Film length, ft	
	35 mm	16 mm
$\frac{2}{3}$ sec	1	$\frac{2}{3}$
1 sec	1½	¾
$1\frac{1}{3}$ sec	2½	1
10 sec	15	6
30 sec	45	18
1 min	90	36
1 min $6\frac{2}{3}$ sec	100	40
10 min	900	360
2 min $46\frac{2}{3}$ sec	250	100
11 min $6\frac{2}{3}$ sec	1,000*	400*
27 min $46\frac{2}{3}$ sec	2,500	1,000
30 min	2,700	1,080
1 hr	5,400	2,160

1 ft. of 35-mm contains 16 frames.
1 ft. of 16-mm contains 40 frames.

* One full reel. However, in actual practice one reel seldom exceeds 950 feet of 35-mm or 380 feet of 16-mm film. The average reel contains film for a 10-minute showing.

[†] J. Soc. Mot. Pict. Eng., September, 1947.

the secretions of their endocrine glands through the stimulus of the sound film. What other medium of communication can even approach the sound-film in this power?

Sound Film and Memory

Earlier in this article reference was made to the "polarization" of attention which the sound film induces by way of the darkened room with extraneous sounds shut out and the gripping hold of the screen story. This phenomenon has profound effects upon the memory.

Psychologists tell us that there can be no learning without memory. Sales or educational material that is presented in the sound film penetrates into the depths of the subconscious mind of the individual who is "lost" in its story, and every item of the material is surrounded by a rich background of associated ma-

terials which serve to aid recall long after the sound-film showing. Having provided both visual images and aural impressions with the material, recognition of the recalled elements is instant and easy.

Proof of the lasting effects of the sound film upon the memory has been provided in abundance by many kinds of tests, some of them revealing facts hard to explain. For example, in some instances, material from a sound film is more readily recalled several months after exposure to it than it is 24 hours or even immediately afterward!

Repetition to Be Avoided

Advertisers who have been told that anything said on the radio has to be repeated at least three times in order to make it sink in, are going to have to learn restraint in their commercials when they get into television or when they use

sound motion pictures—unless to irritate is their purpose.

They are going to find that the less often they say what they have to say about their product in the sound film, the more favorable impression they will create; indeed, they may not have to say anything if the pictures they employ say it without words.

They will also have to learn that the screen audience abhors repeated pictures. It responds against subject matter with even more intensity than it responds in favor of it, a fact that some sound film producers know but that many users have yet to learn.

It can be appreciated readily how markedly the sound film differs, in its psychological factors, from other mediums of expression, the printed word, the radio, the lecture, and the stage. Students of social psychology, of educational problems, of propaganda, of public relations, and of training procedures, are fast recognizing the sound film as the most potent instrument for accomplishing their objectives that has been developed in the field of communication.

The Terms 'FM' and 'AM'

Frequent reference to the terms "AM" and "FM", particularly in connection with TV literature, prompts the republication of the appended descriptive matter, for the benefit of the many projectionists who have inquired about these terms:

Frequency Modulation (FM) — A method of radio broadcasting in which the broadcast waves change in length and their strength remains constant.

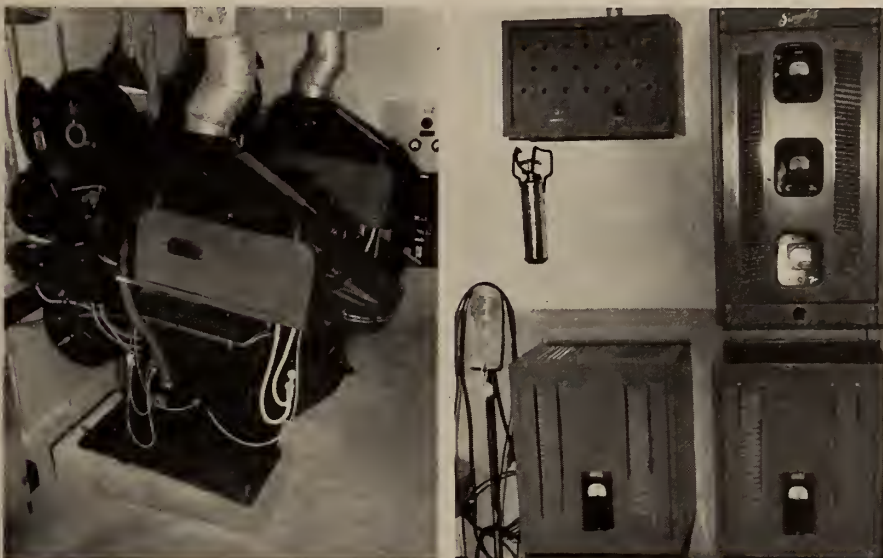
Amplitude Modulation (AM) — The present standard method of broadcasting in which the broadcast waves change in strength but the wave-length remains unchanged.

What FM Does — Eliminates static, noise of electrical appliances and other disturbances that interfere with reception on AM receivers. It also permits reception of the entire range of sound audible to the human ear.

Where FM Operates — The FCC has assigned FM broadcasting to the extremely short wave-lengths. (Because electricity travels at a uniform speed of 186,000 miles a second, a short wave-length means that a large number of waves occur each second, hence they have a high frequency. Frequency is expressed in cycles. One thousand cycles are called a kilocycle, one million cycles a megacycle.) Each FM station is allowed a channel 200,000 cycles wide, compared with the 10,000 cycle channels of standard broadcasting.

Range — High-frequency radio signals have some of the characteristics of light, and like light are unable to follow the curvature of the earth. As a result, FM signals generally cannot be heard more than 100 miles from the broadcasting station. Television stations are similarly limited in range because they also broadcast in the higher frequencies.

PROJECTION SETUP IN VALLEY THEATRE, DE-LUXE DRIVE-IN AT POMONA, CALIF.



Equipment includes (left) Peerless Hy-Condensent arc lamps, with quartz F:2 condensing system, Peerless gloss heat filter and blower, E-7 Simplex projectors and Cinephor F:2 objective lenses. Simplex 250X sound system (right) with dual control emergency operation. Panel in upper left corner permits isolation of any group of auto ramp speakers without affecting balance of system.



Chief projectionist of the Volley is Gene Dougherty, who heads fine crew from progressive IA Local 577, San Bernardino, Calif. Shown at right is hookup for Huff Electric Arc Water Cooler, which is standard equipment for majority of high-omperoge drive-ins.

All Photos by Leo Moore, IA Local 165.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE date is August 16, the place the huge Public Auditorium in Cleveland, and the event the 39th biennial Convention of the IA. Of course, the Auditorium will be the scene of the formal Convention sessions, but if we know IA men as we think we do, they will proceed to invest Cleveland as a whole and will be boring into every nook and cranny—and then some.

The forthcoming Convention will mark the fifth time since its organization that the IA has assembled in Cleveland, the other dates being February 1917, May 1920, June 1926, and June 1938. Persuasive evidence of the growth of the IA since the first Cleveland Convention is at hand in a comparison of locals and delegates represented in 1917 and the tentative figures for the forthcoming gathering, as follows:

February 1917: 297 delegates representing 233 Locals.

August 1948: 1,171 delegates representing 938 Locals.

This gain of more than 700 Locals and many thousands of members is the best indication of a thriving, progressive

organization, because those outfits which stand still or barely move forward soon stagnate and wither away.

Looming large on the legislative program for this 39th Convention are the Taft-Hartley bill and all that it implies for future IA progress; television, which has mushroomed into an entertainment colossus during the past year, and the ever-expanding 16-mm field. Consideration of these items will occasion not a little brow-furrowing on the part of Convention delegates. Experience tells us that the IA will lick these problems. It must!

On the less serious side, this Convention will provide the same grand opportunity for good fellows from all over the country to get together, to greet old friends and make many new ones, and to compare notes on personal and organization progress. These personal gatherings where problems are translated in terms of the individual are what build the morale of any organization, particularly one such as the IA.

We'll be seeing you one and all—and, of course, we're hoping that you'll be seeing us.

- The Tri-State Association, comprised of Locals in Western Pennsylvania, Eastern Ohio, and West Virginia, held its 24th annual meeting last month in Monessen, Penna. F. P. (Reel) McCoy, secretary of New Kensington-Tarentum Local 444, was re-elected secretary-treasurer of the Association. Present at the meeting were IA President Walsh; Wm. P. Raoul, IA secretary-treasurer; Thomas J. Shea, assistant IA president; IA representatives Larry Katz, Harrisburg Local 488, and John Fitzgerald, Cleveland Local 27. The next meeting will be held in Fairmont, W. Va., the date to be announced within the next few weeks.

Incidentally, McCoy's Russian-born wife presented him last month with their fourth child—a son—Dennis Raymond. These McCoy's certainly are branching out.

- George E. Thrift, former secretary of Local 348, Vancouver, Canada, sailed for London, England, last month with his wife and two children. George was born and brought up in London and this is his first visit to his birthplace in 25 years. He promised to give us a first-hand report of conditions in British projection rooms upon his return to this country—sometime next September—which we, in turn, will pass along to our readers.

- The last meeting of the season for the 25-30 Club was highlighted by the presentation of honorary membership cards. Bernard Schultz, popular New York district manager for RCA, was one of the recipients of this honor, and yours truly, the other.

George Raaflaub, Lionel Wilcox and Lawrence Sherman, Syracuse Local 376, paid a surprise visit to the meeting and received a warm welcome from the gathering. Raaflaub, who is secretary of his Local, recently made the grade in the Commandery of Masonry and may henceforth be addressed as "Sir Knight Raaflaub."

- Look for a real scrapper for the public good and the odds strongly favor that you will find him not in the big cities with their attendant publicity about

The John P. Filbert Company of Los Angeles sponsored a demonstration of the new Brenkert BX-60 projectors at a recent meeting of West Coast projectionists. Among those present and shown in the front row above were, left to right: W. W. "Billy" Wise, business agent, San Diego Local 297; George Schoffer, business agent, Los Angeles Local 150; Jack Scoles, chief projectionist Columbia Studios; unidentified man; Billy Weisheit, 20th Century-Fox; unidentified man; Fred Loakes, Walt Disney Studios; John Filbert, and H. J. "Dutch" Benhom, Brenkert factory representative.



every move of a civic official but in some comparatively small community that rarely makes the national news wires. This item concerns just such a personality.

The man is A. Z. Lokey, fire chief of Greenville, Miss. Four years ago he ordered a cleanup of and improved safety conditions in all Greenville theatres. As might be expected, nothing happened; so after battling for two and one-half years against a strongly entrenched group of selfish people, Lokey enlisted the aid of the press. That did it. Chief Lokey immediately "landed in hot water" with four of the six councilmen, and the mayor requested his resignation. Lokey stubbornly resisted and told his foes to fire him when they got ready. They didn't dare, of course, not with the press alerted.

One year later three of the councilmen and the mayor were defeated at the polls. Lokey returned to the attack with renewed hope and vigor. Last month the council, backed by the new mayor, directed the theatres to improve conditions forthwith or summarily lose their licenses. The newspapers backed up the order, suggesting that the offenders be haled into court. Needless to say, the theatres promptly complied.

Following are the violations Lokey campaigned against for the past four years and which, until recently, the theatre owners wilfully failed to correct:

PARAMOUNT THEATRE: Improper and hazardous projection room wiring. Extremely combustible material backstage.

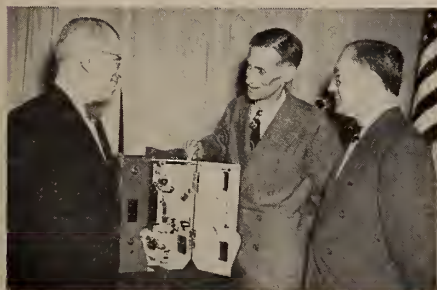
DELTA THEATRE: Projection room woefully below standard of National Board of Fire Underwriters.

LAKE THEATRE: Failure to remove popcorn oil barrels from behind stage doors where they are exposed to wood and the exit door.

HARLEM THEATRE: Projection room door not self-closing as required by local law. Many violations of Underwriters standards in projection room.

LINCOLN THEATRE: Improper and hazardous wiring in projection room. Combustible material therein. *No arc lamp vents in room*; in fact, no opening in room ceiling. No fusible links for port

Seen at premier showing of new Brenkert BX 60 projector: IP's Harry Sherman, Karl Brenkert, and Morris Rotker, president of 25-30 Club of New York City.



shutters. Balcony exits partly blocked.

Of course, in the event of a catastrophe growing out of these shocking conditions, the theatres would do the right, the proper, the gracious thing. Sure, they'd run a benefit for the deceased's relatives.

Fighters for the good cause like Lokey are all too rare not to rate the utmost support and admiration of the craft, irrespective of which community they serve.

- A visitor to our city last month was Arthur Todd, member of Hollywood Local 165 and assistant to Merle Chamberlin, projection chief at the M-G-M Studios in Culver City. Accompanied by Mrs. Todd, Arthur, who is the Monarch of the Cinema Grotto of Hollywood (Masonic organization), came on East to attend the National Grotto Convention which was held in Atlantic City.

- Another out-of-town visitor to the IP offices last month was Carl E. Graham, member of Local 671, Canton, Ohio. Carl is the DeVry distributor in his territory and also manufactures the well-known Graham End-Gripper.

- Pheasant raising is a new avocation of our very good friend, Clarence Earl (Red) Rupard, Dallas Local 249. Red's latest hobby, which started as a gag, shows signs of becoming a very successful business venture. He who laughs last laughs best. Eh, Red?

- Earl Tuttle, business agent of Local 396, Binghamton, N. Y., was elected a vice-president of the Union Label Trades Department of the State of New York at the State Convention recently held in Rochester, N. Y. Other IA men elected to office were Tom Murtha, business agent Brooklyn Local 4; D. R. Rood, business agent Utica Local 128; H. Paul Shay, Elmira Local 289, and William Goff, Syracuse Local 376.

- Morris J. Rotker, president of the 25-30 Club, celebrated his 34th wedding anniversary last month. Morris is one of the real grand old-timers in the business, having been a projectionist since 1908.

- Sam Kaplan, former president of New York Local 306, died July 1. He had served for several years as a member of the executive board until failing health forced him to forego all Union activities.

- A note on our desk reminds us that the LaVezzi Machine Works of Chicago is now celebrating its 40th anniversary. Edward W. LaVezzi, who founded this organization, opened a small machine shop back in 1908, but his reputation as a manufacturer of precision projector parts soon gained for him a nation-wide



IA President Walsh tries on a pair of cowboy boots presented to him at the Texas State Federation of Labor Convention which was held in Fort Worth, June 21-25. Officers of Fort Worth Local 330, H. L. Woods (left), business agent, and B. Y. Coffman (right), secretary, made the presentation.

reputation. Today the name LaVezzi is synonymous with excellence of service and reliability.

The new enlarged LaVezzi plant, which is being successfully operated by Edward's two sons, Bob and Victor, is a tribute to a splendid organization that despite its early struggles for existence, never wavered in its determination to render the best service possible to its many friends in the industry.

- Charlie Wheeler, secretary of Geneva Local 108 and of the New York State Association of Projectionists, advised us recently that he, too, is a flying enthusiast. Charlie owns his own plane and as soon as he gets his pilot license he promises to fly down to New York to take lunch with yours truly. That's fine, Charlie, but please don't fly too close to our home.

- Wayne Swank, Sr., president, and Alonzo S. Bennett, secretary-treasurer, will represent Local 521, Long Beach, Calif., at the forthcoming IA Convention.

- One of our overseas subscribers, R. D. Seth of India, is most anxious to correspond with other projectionist readers of IP. Seth is chief projectionist at the Polo Victory Talkies in Jaipur City, Rajputana, India, and would welcome an exchange of ideas on things projection with members of the craft on this side of the ocean.

- Lou Walters, formerly southwestern district manager for Ampro Corporation, is now manager of the theatre equipment division of the Universal Corporation of Dallas, Texas.

- In appreciation of his many years of service as business agent of Local 84, Hartford, Conn., *without pay*, Rube

(Continued on page 28)

New Brenkert BX-60 Projector Marks 40th Year of Noted Engineering, Manufacturing Company

DESIGNED especially for the medium-size theatre, the new Brenkert BX-60 35-mm film projector was introduced to the trade on June 10, the 40th anniversary of the founding of the Brenkert Light Projection Co., now a subsidiary of RCA. (See appended summary of development of the Brenkert organization through the years.)

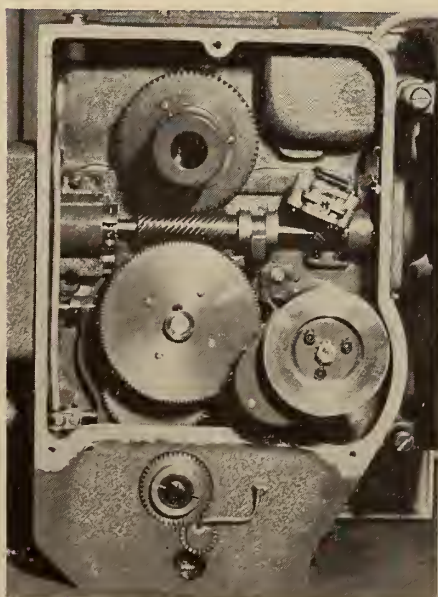
Engineering and performance features of the new BX-60 projector include both single- and double-shutter models, a rear shutter blade which supplies ample ventilation to the projector aperture for cooling purposes, and an operating compartment that is oil-free and roomy, providing maximum space for threading.

An important feature is the automatic lubrication system, a unique method exclusive with Brenkert. All rotating shafts running through the main case casting are equipped with oil baffles, so that shaft bearings are continuously lubricated throughout their length; but no oil can leak into the operating compartment.

Unit Construction Throughout

The smartly styled housing and main frame for the entire mechanism is a ruggedly constructed one-piece metal casting. The accuracy of the precision machine work on the case is insured by a special heat-treating process. This rugged non-warp main frame supports all of the working parts of the projector on accurately machined surfaces, thereby

Gear side of Brenkert BX 60: sealed-in oil system (upper center); heavy-duty gearing, and trouble-saving shear pin (lower center, outside housing) which disengages gear train from motor-driven parts if accidental obstruction overloads mechanism, thus preventing stripping.



assuring correct alignment of all shafts and gears.

A large door on the operating side of the projector exposes the entire film compartment for ease of operation. The door is well ribbed to prevent warping, and two glass-covered openings permit observation of the film loops above and below the film trap while the mechanism is in operation.

The entire inner surface of the film compartment is finished in light-colored enamel so that the film may be seen easily. Adequate space is provided between all operating parts in the compartment to facilitate threading quickly and accurately. Cleaning and making operational adjustments can be accomplished in a minimum of time. Quick access to the shutter blades and the rear of the film trap is gained by removal of a panel on the operating side which is held in place by two thumb screws. A filter glass is provided in this panel for viewing the light on the aperture.

The intermittent mechanism in the BX-60 is identical with that in the larger Brenkert BX-80 projector. This mechanism has been thoroughly field-tested to assure the elimination of all "bugs". The heavy-duty gearing always employed in Brenkert projectors is used in the BX-60. Unpainted metal surfaces have been heavily plated to protect them against rust, and all screws have been hardened and finished.

Check-List of Major Features

Unit construction is used to facilitate easy, quick and accurate servicing. All units are doweled to the main frame for correct alignment of parts, thereby maintaining the accuracy built into the mechanism. Here is a check-list of the major features of the BX-60 projector:

AUTOMATIC LUBRICATION: The whole mechanism is awash in oil continuously.

STURDY INTERMITTENT: Large intermittent bearing area assures rock-steady projection throughout a long life.

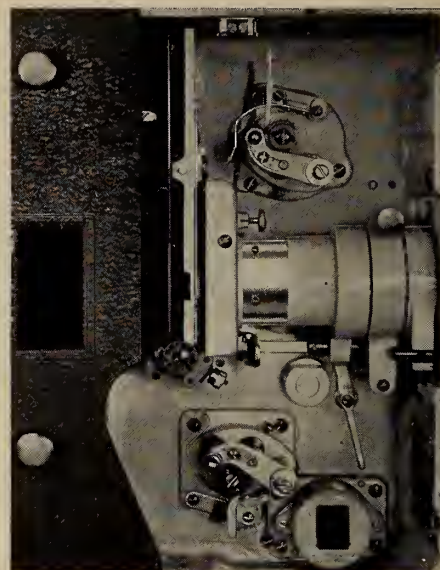
HEAVY-DUTY GEARING: Heavy-duty construction with wide meshing gear surfaces.

SHUTTER: This projector is available as either a single rear-shutter mechanism or as a single rear- and single front-shutter mechanism.

FILM TRAP: Heavily constructed as a one-piece casting. The film is guided the full length of the film trap to prevent side-sway.

FILM GATE: Two sets of hardened, polished steel pressure pads are provided. The gate can be removed quickly by merely loosening one thumbscrew.

FRAMING: Easily done by turning knob from either side at screen end of projector. Intermittent sprocket is rotated so that the film is always supported by the film trap and gate shoes right up close to the sprocket at all time.



Operating side of Brenkert BX 60 projector, showing film path. Roomy operating compartment provides ample space for easy threading and cleaning.

LENS MOUNTING: Lens is held rigidly and firmly in both the front and rear of the mount, and is easily removed by simply loosening two knurled thumbscrews.

FRAMING APERTURE: A second film aperture is provided for ease of framing which is five frames ahead of the picture aperture.

ROOMY OPERATING COMPARTMENT: Ample space for easy threading and for ease of cleaning.

SPROCKETS: All sprockets are hardened and ground. Each sprocket may be quickly removed from its shaft by unscrewing a single screw. Sprockets may be reversed to prolong their life.

The Brenkert's Co.'s 40 Years

The initial efforts of the Brenkert firm, which started operations in a partitioned section of a real estate office, resulted in a stereopticon. The production equipment consisted of a hand-operated drill press, a small vise, several boxes of screws, a dozen various-sized drills, and a few taps. Today the Brenkert plant is a modern fireproof building containing approximately 45,000 square feet of floor space.

The same two men who operated the young firm from its beginning head the company's operations today: Karl Brenkert, president and general manager, and Wayne Brenkert, vice president and assistant general manager.

World's 'Steepest' Production Line

Recounting his early experience in the business, Karl Brenkert said that expansion soon forced the fledgling firm to move from the real estate office to a barn. "We dispossessed two cows from the barn on the old homestead," he explained, "and by using our small profits, we added new equipment as fast as our meager finances would allow it. More equipment meant more floor space, but we solved

(Continued on page 28)

Theatre Television: A General Survey[†]

By Dr. A. N. GOLDSMITH

THIS fourth and final article in a series wherein was discussed in detail the many problems incident to the launching of theatre television, consists of the discussion which followed the original presentation of this paper. As so often happens in the case of oral presentations, this discussion serves to particularize and clarify many of the more general observations made. The discussion follows:

MR. JAMES J. FINN: Do you suggest the feasibility of interpolating television clips into motion picture programs as presently constituted? I should think that that would take a great deal of chest-puffing on the part of an art that is already solely pressed to evolve a 10½-hour program schedule daily for network stuff.

Programming is today one of the major problems in television. The technicians have far surpassed them. When the F.C.C. issued its order for 10 hours daily, there was great consternation. The television adherents now come forward and say, "We will not only put on television programs on a network scale for the swollen budgets of Lux, Rinso, and similar concerns—they being the only people with enough money to do the job—but we will give you supplementary lines to keep the motion picture theatre in business."

This is quite apart from the structural facilities of existing theaters, which you as an outstanding engineer will agree offer some pretty severe problems for the installation of television equipment.

Theatre, Home Tele Sharply Divided

DR. GOLDSMITH: I should like to separate the answer to your question into two parts. In the first place, I have not heard that the existing television broadcasters have any intention of providing programs for theaters. That is, when I spoke of transmitting programs to a theater, I meant transmissions by the owners of the theater or by a special theater group.

If the XYZ theater in Chicago, for example, wanted theater television, it would get it in all likelihood from central studios and central transmitters owned by the XYZ company, and not, as a contrary procedure, from television broadcasting Station WPQR. Only in the rarest instances if, for example, the President of the United States were speaking or some tragic disaster had just occurred, might the theaters pick up a broadcast program and show it in the theaters.

So that, as to the second point, there would be no systematic correlation or interconnection so far as presently can be seen between television broadcasting, which goes to the homes of all, and theater television, which is a form of "narrowcasting" and is sent only to a specific group of theaters within the control of the corresponding company that owns the studio and transmitters.

MR. FINN: If it should be a delayed program by so much as an hour, then it is simply a delayed newsreel. Moreover, with

feature pictures today running anywhere from 75 to 120 minutes, it is going to take close scheduling.

Program Interpolation Difficult

I am speaking now about the interpolation of spot tele-events into the motion picture program as presently constituted. That is one aspect.

Second, suppose that we do assert ourselves and utilize this new art. What is going to happen during a period of transition? Shall we break into the feature? What would the tele-industry have to offer to us in the nature of a feature attraction that we today cannot obtain better from film?

DR. GOLDSMITH: It is not thought that news events would necessarily come to the theaters with any delay. If an event were happening, say, in Washington or Detroit, it would be picked up by the television

cameras, nationally syndicated, and sent to all theaters desiring to use it. So that there would be no delay so far as we now know. If the event in question happened to be something like the Kentucky Derby, naturally it would be scheduled at the time the Derby took place.

So that, to answer your first question, I do not see any delay necessarily involved in theater presentation of news events, provided one knows when the news event is going to happen. When something happens that is unforeseen, the theaters may not be able to use it immediately, because they are momentarily in the midst of the presentation of something else. That is entirely conceivable.

However, the news event may be so serious and important that they will nevertheless stop their regular performance and show it. Let us assume, for example, that some major disaster occurred in some great city of the United States, either by accident or by the design of others. If that disaster occurred, I believe there would be few theater exhibitors in this country that would not stop any usual performance to show such an event to

(Continued on page 22)



To the Editor of IP:

I noted with interest the article "Projection Factors of New Acetate Film" in IP last month (June, p. 6), and more especially was I interested in the comment under the subhead "Importance of 0.943 Sprocket."

Would it not have been in order to mention that this 0.943-inch intermittent sprocket size was recommended by Century Projector Corp., in cooperation with Dr. Carver of Eastman Kodak Co., for use on the Waller Gunner Trainer (multiple projector unit for training aerial and other gunners), and at least note that it has been standard on Century projectors since 1943?

As a matter of fact, we have been asked recently when Century was going to change to the "new" 0.943 dimension. It would undoubtedly be helpful to the field to know that Century has had perfect operating results with the 0.943 sprocket, without adverse comment, for the past five years.

L. W. DAVEE, Sales Manager
Century Projector Corporation

[IP is happy to acknowledge not only the pioneer work but the continuing insistent championing of the 0.943 sprocket by Century Projector Corp. After all, it requires real industrial courage to embrace the new rather than adopt a wait-and-see attitude, of letting the other fellow do it.—ED.]

To the Editor of IP:

Many drive-in theatres are now or will soon witness the peeling of the

painted surfaces on their screens due to the failure to provide proper means of ventilation in such structures.

These screens must be painted each year, due to the terrific beating they take from the weather. The first two or three paintings will not show up this defect of ventilation, however, but on subsequent refinishing the paint will crack and peel off right down to the basic surface. This is due to the moisture which collects on the inside and is pulled right out through the screen paint.

The first paintings will stay put due to the porous nature of the basic surface—asbestos or gypsum board, etc. But repeated paintings result in a complete sealing of the entire surface, and if suitable ventilating means are not provided, no paint now known will withstand the resulting moisture penetration.

Seams and cracks between the basic surface boards should *not* be sealed up—by paint or caulk or anything—as these provide a means for exhausting the moisture from within. We've seen such caulking jobs which outlined every board in the screen and rendered each section highly visible. Far better to leave these seams open.

KEN CALDWELL
National Theatre Screen Refinishing Co.
129 Zenner Street, Buffalo, N. Y.

[We assume that Ken knows his stuff on these and other types of screens, the result of having treated many screens with the renowned Arctic Blanch resurfacing process.—ED.]

[†]J. Soc. Mot. Pict. Eng., February, 1948, p. 95.



TELECASTS

Notes on RCA's Large-Screen Theatre-Tele System

HIGH-QUALITY television pictures measuring 18 by 24 ft. with an advanced optical system developed have been demonstrated on various occasions recently by RCA. This huge movie-screen picture is produced by the highly efficient Schmidt optical system.

Three major elements combine to make up a large-screen projection television system. The first is the projection kine-scope, or cathode-ray picture tube, which translates the video signal into a pattern of light and shadows on the tube face. The second is the optical system which collects the light rays from the face of the picture tube and directs them to the screen, properly focused, to form an image of the desired size. Third, is the screen on which the picture is seen.

Optics, Projection Distance

RCA's new projector utilizes a 15-inch cathode-ray picture tube operating at 80,000 volts, and an optical system employing a 42-inch spherical mirror and a 36-inch aspherical correcting lens. This is the largest Schmidt-type optical system in the world with the exception of the 72-inch Schmidt telescope at Mt. Wilson.

The projection distance or "throw" of the new equipment is 40 feet. Although this is not sufficient to permit mounting of the projector in the theatre's regular projection room, a throw of this distance enables the relatively compact equipment to be installed in the balcony of some theatres. Ceiling mounts are also a possibility, according to some authorities in the field.

Construction of the large 42-inch mirror for the new optical system necessitated the development of special machines and new techniques. The 36-inch aspherical correcting lens used in the equipment to overcome optical effects introduced by the spherical mirror is made of glass—an inherently costly process.

However, it is expected that eventually these lenses may be molded from plastics as are the smaller correcting lenses for home projection-television receivers. In addition to costing only a few dollars each, these plastic lenses, which equal the optical properties of glass lenses, offer the added advantage of being practically unbreakable.

The special projection tube or kine-

scope employed in the large-screen projector was specially developed by RCA for use in reflective optical systems. Into this projection tube was designed a metal-backed screen such as is used in all RCA projection tubes. New types of phosphor compounds were developed which were coated with a fine metallic film, thin enough to allow the passage of electrons. This greatly increased the tube brilliance. In addition to this, a new type of electron gun and other elements were developed to withstand the very high current used by the projector.

The development tube, the reflective optical system, and the necessary power supplies and control equipment are all self-contained in one unit. While the projector is designed for fixed focus operation, the various operating controls mounted on the unit permit the operator to adjust the brightness, focus, framing of the picture.

Safeguards in Power Unit

A new type of power supply has been incorporated into the large screen projector which eliminates the danger usually present when high voltages are used. The high-frequency oscillator power supply used, instead of the conventional 60-cycle type, prevents the storage of high voltage in the filter circuits, thus eliminating the potential hazard to operating personnel.

Television signals can be fed to the large-screen projector from any regular

Yorkshire to Pine Bluff to Sydney

The appended excerpts are from only three of the many letters that reach IP weekly:

Yorkshire, England: My check for the next 12 issues will reach your London agents shortly. The quality and layout of your journal is superb, and no intelligent member of our craft should be without it.

A. BUCKLEY

Pine Bluff, Arkansas: Your magazine more than well worth the time of any projectionist. I read it from cover to cover.

CLAUDE HERRINGTON

Sydney, Australia: I have read various books, pamphlets, etc., relating to projection, but IP is far and away the tops of all of them.

ALLAN R. PETTIFORD

television source such as network coaxial lines, microwave television relay sources, from studio or camera pickup sources, or any other standard video source.

Possible applications of large-screen television, in addition to that in the theatre include the accommodation of overflow crowds at conventions and meetings, and accommodation of studio visitors.

TERRIFIC TV SURGE OVERALL REVEALED BY SURVEY

COMPELLING evidence of the giant strides forward registered by television, both technically and economically—which in turn have led to public acceptance nothing short of terrific—is contained in an authoritative survey of the over-all TV setup recently completed by *Tele-Tech*, ranking trade paper in the radio and TV field, and is presented here by arrangement with that publication. Projectionists will find much food for long and serious thought in the appended digest of this survey:

Status of TV Stations: A total of 93 commercial TV stations have been authorized by the F.C.C. Of this number 26 are now on the air. Applicants total 205, construction permits total 67. TV stations are operating in 18 cities; authorized stations schedule service to an additional 24 cities in 15 states in 1948. By the end of this year, 42 cities in 28 states with a TV population of 66,868,000 will receive commercial programs from 65 stations.

See 3 Million Television Sets by 1950

TV Receiver Production: With an estimated 310,000 TV receivers in use at the end of April, and prediction that 600,000 additional sets will be produced by the end of the year, 910,000 operating TV receivers will be the minimum number of sets in use by year's end. Production estimates for coming years indicate there will be 3 million TV receivers by 1950.

Coaxial and Relay Facilities: Over 2,000 miles of coaxial lines will connect Buffalo, Cleveland, Toledo, Detroit, Chicago, Milwaukee and St. Louis by Fall of this year. These facilities will be extended to hook-up with New York, Philadelphia, Baltimore, Washington and Richmond by December, and a Pacific Coast hook-up will be effected in time for the Jan. 1, 1949, Rose Bowl game for nation-wide television.

Coaxial and Relay Rates: Tentative rates proposed for TV coaxial and relay services approximate \$35 a month per airline mile for 8 consecutive hours daily, \$2 a month

per mile for each additional hour. Terminal equipment will be approximately \$500 a month for each station for connecting networks, and \$200 per month plus \$10 per hour of use for occasional service. Rates now in effect for sound broadcasting will apply for the separate sound channel needed to complete TV programming.

Servicing, Price Trend, Supply

Trained Servicemen: The "education" of TV servicemen has been largely confined to installation. Putting in a new factory-tested set, however, is a far cry from actually servicing such a set after the "guarantee period" is over. Competent servicemen will be able to name their own wages a short time hence.

TV Antennas: Channel 13 now being utilized in some zones will be an unlucky station for many set owners by showing up the ineffectiveness of many of the patented antenna freaks that have been sold to the public. There are some excellent examples of wideband jobs, but many of the presently installed dipoles now serving admirably on the lower channels will have but little pickup in some of the upper bands.

Outlook for Color: While electronic color in TV is no further along (as far as the layman is concerned) than it was a year ago, there has been some clarification of the problem in the matter of flicker, color breakup, etc. Research on possible methods is still progressing.

Receiver Price Trends: Average retail price of receivers in volume production during 1947 was approximately \$400. This figure is expected to drop to \$300 for 1948 and to \$200 in 1949, with a considerable volume of sales in the \$150-\$175 price class. Newest of the low-priced sets will be on the market shortly at \$149.95, and a \$99 receiver has been promised by one manufacturer for this Summer.

TV Manufacturers: More than 100 manufacturers will be making receivers by the end of 1948. To date, about 65 firms are offering approximately 134 models, including kits. Some feature only one model; others have as many as eight. The price range is wide, from about \$150 to more than \$2500.

Kodak's New Video Film Lab

Eastman Kodak has set up a new laboratory to study films for television. Indications from tests to date are that film prints developed to give good quality on motion picture screens are equally effective when transmitted and shown on video screens.

Negative material that lends itself to rapid processing at high temperatures will be important, it is thought. While a television system has a restricted brightness range of not more than 50 to 1, and between closely adjacent picture elements the maximum contrast may fall as low as 10 to 1, it still can reproduce adequately the brightness range present in the subject matter being televised. A reproduced picture may give a pleasing appearance and good contrast even though the absolute range of brightness is restricted.

Future film productions for television will be designed for satisfactory reproduction on the small home receiver screens.

Home Movies Now 25 Years Old

The first quarter century of home movies—during which movie making on 8-mm and 16-mm films has grown to an internationally popular hobby and an important aid to education, science, business, and industry—was observed on July 5.

On that date, in 1923, Eastman Kodak placed on sale in New York City the first complete 16-mm motion picture outfit—including camera, film, and projector—and announced the first amateur film processing service which made possible movie making for everyone.

Today it is estimated that there are more than 1,100,000 families in the United States who own amateur movie cameras. In the

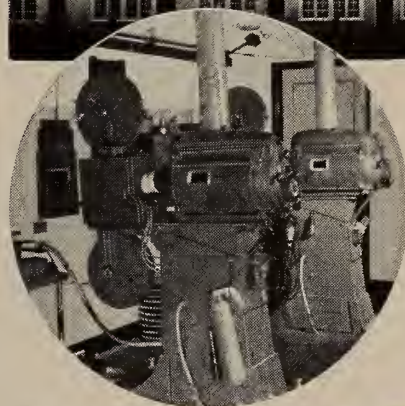
16-mm field there are an estimated 325,000 cameras in active use; in the 8-mm field, 775,000. Approximately 950,000 families, or nine out of ten owning movie cameras, also own a movie projector of some type.

New Du Pont Film Sales Office

The Photo Products Section of the Du Pont Co. has opened a new district sales office in Cleveland at 2028 Union Commerce Building for servicing of accounts in Ohio, Michigan, most of Indiana and Kentucky and half of W. Virginia. The office will handle the entire Du Pont line of trade, industrial, motion picture and x-ray photo products, including films, papers and chemicals.



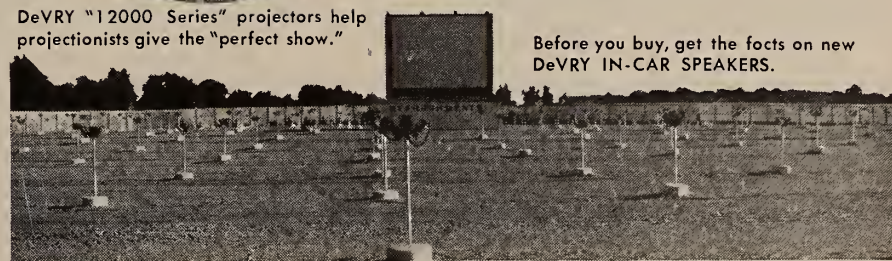
They come back again and again to see Hollywood's finest productions of their projected best—with DeVRY'S.



DeVRY "12000 Series" projectors help projectionists give the "perfect show."

Increasingly—in the "States," Canada and throughout the world—Exhibitors are building bigger "box office" with new DeVRY "12000 Series" theatre equipment. Whether you are planning a new operation—standard or drive-in—or considering modernization of your present equipment, it will pay you to learn more about DeVRY equipment today.

Before you buy, get the facts on new DeVRY IN-CAR SPEAKERS.



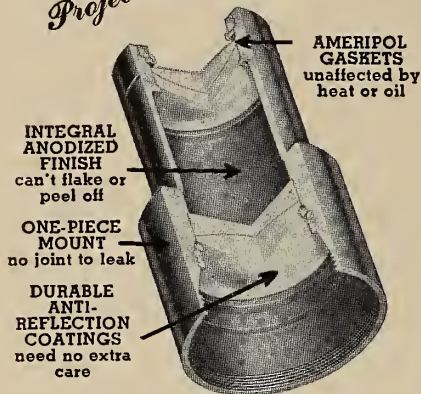
DeVRY CORPORATION
1111 Armitage Ave., Chicago 14, Ill.
Please rush information on
☐ "12000 Series" Projectors:
☐ "12000 Series" Amplifiers:
☐ IN-CAR Speakers

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ADDRESS _____
CITY _____ STATE _____
ZONE _____

FOR THE PERFECT SHOW Indoors or Out...

...YOUR BEST BUY IS DeVry

LOOK inside a SNAPLITE... See Why it's The Projection Lens of Quality



All Aluminum Construction

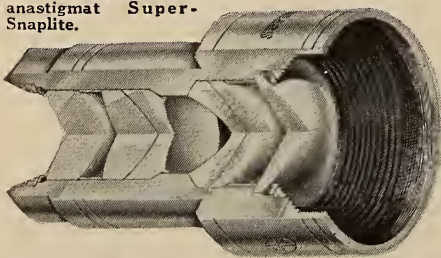
Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

...

TROUBLE-FREE performance is assured by the hermetically sealed construction of Snaplite and Super-Snaplite lenses. They never need to be taken apart for cleaning—no dust or oil can enter! And their anodized finishes can't flake off!

For brighter . . . sharper . . . clearer pictures, use f/2.0 Snaplites or f/1.9 Super-Snaplites in your projectors! Full details of all Snaplite lenses are given in Bulletin 204, available from your local supply dealer.

The fastest lens made—the f/1.9 six-element anastigmat Super-Snaplite.



KOLLMORGEN
2 Franklin Avenue
Brooklyn 11, New York
Optical CORPORATION

THEATRE TELEVISION ANALYSIS

(Continued from page 19)

the people, for one thing, for national reasons of interest.

The other point mentioned is this: What shall be done about interruptions to 75- to 120-minute feature films? How shall the exhibitor break in or interpolate? I believe that only the skilled exhibitors and program planners could answer such a question, or work out a suitable method.

However, it is thought that there is nothing sacred about performances having lengths of 75 to 125 minutes. So that it may well be that in the future there will be some feature films with intervening shorter films between them, thus offering a new type of program. Presumably someone will find the way to work out such procedures.

Strong Preference for Home Program

MR. FINN: If I had a good television set in my home, why should I patronize the Gem Theater on the corner?

DR. GOLDSMITH: The programs which will be seen on television receivers in the home are not the programs the audience will see in the theater. In the home there generally will be seen commercially sponsored programs of a certain range and type of construction with which the public is slowly becoming familiar. They are excellent and appealing programs, but they are not the sort of program which will be found in the theater.

If, for example, a great star and the actor who plays opposite her or him were to appear in a "television trailer," as it may be called, preceding a feature film in the theaters, and to be seen only in the theaters (because it was transmitted on a non-public frequency) the home audience would know nothing of it. To see such a television-theater program, it is necessary to go to the theater and to pay the admission price. And it is entirely right and proper that that should be the case.

MR. MCKEE: We finance little exhibitors who build theaters, 600-seaters. Their average business is \$1,200 to \$1,500 a week. Sixty per cent of all the theaters over the country have less than 500 seats. Of that 60% one-half have less than 300 seats. There are only about 11% over the country that have over 2,000 seats.

Tele Problems Confuse Exhibitors

We are ready now to build theaters, starting one out on Long Island within ten days. Television has us a little disturbed. A 600-seat house with land costs \$200,000 today. Our banks are very much disturbed about television. So we studied television the last four or five years, and what it is going to cost us in the theater.

Today, 50 cents of every dollar taken in these small theaters goes for overhead, without the cost of the film. So we started to experiment with television. We find that the television machine is going to cost us about \$25,000. We find that we may have to pay a royalty per seat to the manufacturer of the television. We find that we have to pay for the show coming in. We have to pay ASCAP. We don't know what Mr. Petrillo is going to ask.

So, on a 500-seat house, averaging a net

of 50 cents, if we charge a dollar and fill that house right to the end, which would bring in \$500 to us, and if we tried to amortize some of the equipment, the show would cost us about \$2,000 for one night. That is the case in which we use a theater and we use television as a side line.

Financial Aspect Not Inviting

We have been talking it over with our architect. If we are going to go into television, we are going to reverse the situation. We are going to build a television theater, and we will run film as a sideline, because if we follow all that has been said tonight, the cost of operating the theater, the cost of changing a theater, fixing the lights, possibly putting the projector back of the screen or putting it halfway down the aisle and eliminating some seats, and all the other things that have been said, it would be impossible to stay in business.

If we build a television theater in the cheapest form, it is going to cost \$150,000. If we try to amortize that all the way through, we shall have to charge about \$3 admission, for a 500- or 600-seat house. We are trying to find out from where we are going to get the business. The only thing may be a prize fight at ten o'clock. If we put it in our regular theater, we shall have to change the entire audience before that, and then we have to charge double admission for prize fights.

There is no afternoon business. The average small theater over the country in the matinee business does not do \$8 to \$10. In some of the big houses they do not even do \$50. If we are going to have any matinee business, what are we going to run in the theater when we use television? We cannot use baseball. Maybe we shall use home economics.

Necessary Admission Price Prohibitive

If we are going to charge a dollar admission in the afternoon for women to come in



M. B. HORWITZ—President and General Manager, Washington Theatre Circuit, Cleveland, Ohio—says:

"For more than 10 years RCA Service has greatly aided us in satisfying our patrons with good sound."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.

and see how to cook or bake a pie, we are not going to get the money. We cannot even get them in there to see a good picture and charge 30 cents in the afternoon, for regular theater programs. If we are going to charge them for television and have most of the show on film and a little of it is going to be a live show, and have the costs coming in, we shall all go broke.

If you say we are going to have co-operative ideas and coaxial cable and a half-dozen things in which a group of exhibitors are going to combine together and show, if you have had any experience with exhibitors you will know that it either ends up with just two running the business or it ceases to exist.

So we can see television only from one viewpoint, and that is a separate television show—and just try to get an RFC or an FHA loan on that.

DR. GOLDSMITH: Mr. McKee's points seem extremely well taken, and they emphasize two things: First, as I have pointed out, the television solution for the type of theater he is talking about may be a type of equipment which is not now available, methods not yet discussed, and the like.

The solution in each case depends largely on the sort of theater, and therefore the solution in each case may be different. It may well be that for the small theater a large television program syndication group and more emphasis on television would be required.

The paper which I presented was ad-

ressed primarily to the larger theaters, where major and fundamental operations will remain on film, at least for quite a time into the future.

Peculiarly an Exhibitor Problem

However, the important point that I wish to stress in connection with Mr. McKee's remarks is that obviously there has been accomplished exactly what was desired—namely, to point out that the exhibitors themselves have to tackle this problem and solve it. The engineers cannot give showmen the answers. If the exhibitors tell the engineers what they want and can afford to pay for, and how they want to use it, the engineers will find the answer or tell the exhibitors that they cannot. They will probably find the answer; they usually have.

However, the one thing that was particularly desired was to stimulate people into thinking out the answers to the showmanship problems. This audience certainly is indebted to Mr. McKee for what he has said in that connection, because he is clearly thinking his way through the problem; and if others will do the same, we may be confident that it is going to be solved.

Photography Reveals . . .

The nature of shock waves created by aircraft and guided missiles at supersonic speeds. By photographing the water waves set up when models of supersonic wings are

towed through a channel, engineers can duplicate shock wave patterns by maintaining a ratio between the velocity of the model and of water waves equal to the ratio of the velocity of a supersonic component and of sound.

• • •

The fuel spray patterns of injection nozzles in internal combustion engines. Using a stroboscopic light source synchronized with the fuel pump, petroleum technicians can "stop" fuel spray with exposures of one to two millionths of a second, revealing the general shape of the spray and the direction and distribution of fuel particles.

• • •

The track of guided missiles. Using a motion picture camera mounted on a reflecting telescope, set on the mount of a 90-mm anti-aircraft gun, scientists can accurately follow the flight of guided missiles.

The location of radioactive particles in uranium ore. By placing a polished section of the ore in direct contact with photographic film, the radioactive particles are located.

• • •

The correct time. The U. S. Naval Observatory makes its time determination photographically, recording the images of stars on a special photographic plate which then is measured precisely under a microscope.

You Sell

A Picture On a Screen...

Make It the Best with

Super Cinephor Lenses



You invest heavily in a building, equipment, and personnel to sell one thing . . . a moving picture on a screen. You can't afford to skimp on that. Your screen images must be the finest . . . critically defined, uniformly brilliant, pleasant to look at. One way you can be *sure* that your screen images are the *finest* is to use Bausch & Lomb Super Cinephor projection lenses, the standard of excellence in the theatre field. Bausch & Lomb Optical Co., 616-T St. Paul St., Rochester 2, N.Y.

BAUSCH & LOMB

OPTICAL COMPANY



ROCHESTER 2, N.Y.



TELEVISION: HOW IT WORKS

(Continued from page 12)

until it reaches element 6. At this point the camera snaps back rapidly to element 7 at the beginning of the second line and moves at a uniform rate along the second line until it reaches element 12. The camera then returns very rapidly to the left and starting at element 13 on line 3 it scans the third line.

In this manner the procedure continues until the entire pattern is scanned. Note that at any one instant the camera receives light from the particular element

at which it is aimed and focused and produces an electrical impulse which is proportional to the amount of light reflected by this element. So much for the scanning at the transmitting end where the picture is being televised.

At the receiving end let us assume that we have a projector which projects a narrow pencil of light on the screen equal in area to one of the square elements. This projector, like the camera, can be moved horizontally and vertically so that the light can be focused on any part of the screen. Suppose further that the electrical impulses from the Tv camera are fed to the projector and arranged to control the intensity of the light emitted by the projector in accordance with the amount of light registered by the camera at any particular instant.

Electrical Synchronizing Pulses

Under these conditions, before a picture can be obtained at the receiver the motion of the camera at the scene being televised and the motion of the projector at the receiver must be properly coordinated or synchronized. This means that the camera and the projector must go through the same movements together, that the projector must at all times be focused on exactly the same element in the picture as that on which the camera is focused.

In Fig. 4 we have assumed a sort of mechanical linkage between the camera and the projector to accomplish this; actually no such mechanical linkage is possible in Tv, and we shall see later that electrical synchronizing pulses are used to control the camera at the transmitting end and the projector (or picture tube) at the receiver, so that both the scene being televised and the image which is being reproduced at the receiver are scanned in unison—that is, the scanning is synchronized.

The image shown in Fig. 4 has been scanned only as far as element 13; element 14 is about to be scanned. As a result the image at the receiver is totally dark beyond this point since the lower elements have not yet been scanned and hence have not yet been illuminated. We shall explain later on that the observer sees the complete image at one time even though only one element of it is receiving light at any particular instant. This is because the entire scanning process is repeated some 30 or more times a second, and the eye tends to see the image after it is no longer illuminated.

Summary of Tv Transmission

We can now summarize the requirements which must be met before a scene can be transmitted by Tv:

1. The scene must be systematically scanned by the Tv camera which interprets the light values at every element

of the scene in terms of corresponding electrical values.

2. The image must be scanned at the receiving end according to the same systematic plan used by the camera, and the intensity of the light emitted by the light source in tracing the image must vary at every instant in accordance with the amount of light which the camera is receiving at that instant.

3. At every instant the camera and the light tracing the image must be synchronized so that the identical portion of the image is being traced out which corresponds to the element of area being scanned by the camera.

4. This scanning procedure or process must be completed over and over again at a rate of at least 30 times per second so that as far as can be determined by the eye a continuous image of the scene is formed.

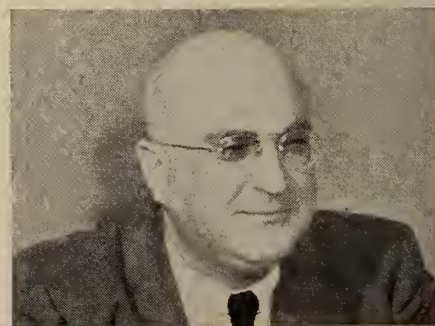
[To Be Continued]

Kodak Photographs Electron Track

Eastman Kodak scientists, using a new photographic emulsion, have successfully recorded tracks of electrons, the small negatively-charged particles that make up atoms. The number of developed silver grains per track in the emulsion ranges from six to a maximum of 28, with the length of the path about 2/1000ths inch—two-thirds the thickness of the average sheet of paper.

GPE First ¼ Net; 25c Dividend

Net profit of General Precision Equipment Corp., (having 13 subsidiary motion picture manufacturing units) for the first quarter of 1948 were \$109,505, compared with \$257,143 net for comparable period last year. Dividend of 25c per share was voted payable June 15 to stockholders of record on May 25.



DEWEY MICHAELS—President, Michaels' Theatres, Buffalo, New York—says:

"For the past eighteen years RCA Service has successfully maintained the excellent sound quality we have endeavored to provide for the patrons of our theatres."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.

FREE!

WRITE TODAY FOR YOUR COPY OF THE COMPLETE AUTHORITATIVE BOOKLET

"HOW TO CONSTRUCT AND EQUIP A DRIVE-IN THEATRE"

Also write for literature on **DRIVE-IN THEATRE EQUIPMENT** including

- Matigraph double shutter projectors
- High intensity arc lamps
- Anti-reflection coated lenses
- Motor generator sets
- Rectifiers
- 150-250 and 500 watt sound reproducing systems
- In-car speakers
- Junction boxes
- Projection room accessories

MOTIOPHOTOGRAPH

INC.

4431 W. LAKE ST., CHICAGO 24, ILL.

The Anatomy of 'Warm' and 'Near' Colors

A POPULAR concept, continually emphasized by workers in the art, is the supposed relationship of red colors (red-purple, red, orange and yellow) with warmth and the blue colors (bluish-purple, blue and blue-green) with lack of warmth. This appears to have no foundation in fact.

Another concept which is accepted far less popularly is the illusion of depth supposedly obtained as a result of certain color conditions. Some say that red is "near," while others claim it produces the illusion of greater distance. Such concepts of distance effects as a function of color on a plane surface are not without some foundation in fact, although, as is often the case, of an entirely different nature.

The "distance effect" is due to the chromatic aberration of the eye, which can be demonstrated in many ways. (This is not related to color blindness.) As no eye can focus blue and red light from a given object in the same place, a purple object can never appear distinctly in focus. The saturation of the color regulates the amount of indistinction for the color.

Effect of Color Saturation

In railroad signalling, a purple light is used to limit the distance of good visibility for some switches. It cannot be seen sharply outlined and often appears as a red dot surrounded by a blue halo. The same effect of reduced visibility is often used theatrically on aged actresses. Neither can a saturated red line be seen clearly on a saturated blue background.

Though the tolerances are wide, it can be said generally that colors of a longer wave-length are more clearly outlined at a distance than those colors nearer the blue end of the spectrum. This is particularly true beyond 10 to 20 feet.

The color "distance effect" is due purely to the color focus of the eye and is not related to eye parallax or stereoscopic vision. As the color effect is most marked when considered in the recognition of details in the threshold of size, the application of such effects is limited to distinct edges and small or distinct forms. An interesting fact concerning the chromatic aberration of the eye is that man may see by the naked eye more detail today than ever before, simply by using a monochromatic light such as sodium.

Factors Affecting Color Purity

The value of scientific data of visibility is not confined to color as a problem of design but includes object contrast, angle of view, time and motion and lighting in general. The visibility of an object is a scientific quantity which is cap-

able of prediction, measurement and theoretical treatment.

However, the general visibility is not to be confused with the eyesight of any one viewer. The quantities which constitute visibility are varied and not confined to any one aspect of light; likewise, the measurement is not confined to one method only.

Obviously, if no light contrast exists between two objects their differentiation is certainly not a function of a readily visible pattern. On the other hand, maxi-

mum visibility will occur when a perfectly sharp edge is totally dark or black on one side, and extremely bright or well-lighted white on the other.

Though maximum visibility may occur under such conditions, it is not necessarily the best all around seeing condition, as the eye would be discomforted by the extremes of light. Whatever the case, it is still true, however, that the ratio of the reflected light from one object or line relative to another is a measure of visibility independent of the personal feelings of the observer.

Among the varied general methods of expressing visibility, relative foot-candles

This ad started something every theatre operator should know...

"I can't see what this guy has to holler about," wrote a Louisiana theatre operator. "Right this minute I am using a Hertner Transverter which I bought in February, 1928, and it has been in constant use ever since—never missed a 'pop' since then, and the commutator has been cut only three times in all that time."*



"As the operator at the Colony theatre I've had the pleasure of using one of your Transverters five and one-half years—approximately 15,000 hours of duty..."

and after 5½ years the
HERTNER Transverter
needed only a set
of new brushes!

THE statement of this operator* is representative of the satisfactory experience of thousands of users of Hertner Transverters all over the world.

After 5½ years of operation he at first thought his Transverter was due for an overhaul. But only a new set of brushes was necessary and the Transverter was good for many more years of service...

*Name on request.



User experience like this proves that with Transverter equipment you are sure of:
(1) reliable performance.
(2) constant screen illumination.
(3) quiet operation.
(4) low operating cost.
(5) long life.

Distributed by
NATIONAL THEATRE SUPPLY
In Canada: GENERAL THEATRE SUPPLY COMPANY
THE HERTNER ELECTRIC COMPANY
Exclusive Manufacturer of the Transverter
A General Precision Equipment Corporation Subsidiary
12600 ELMWOOD AVENUE CLEVELAND 11, OHIO

Distributed by
NATIONAL THEATRE SUPPLY
In Canada: GENERAL THEATRE SUPPLY COMPANY

And from New Haven, Conn.: "Hertner Transverter No. 11791 installed over nine years ago... has run an average of 57 hours per week for over nine years... a total of 25,000 hours during which the only expenditure has been for grease and a couple sets of brushes."*

Equip your projector with a Hertner Transverter for reliable performance, constant screen illumination, quiet operation, low operating cost, and long life.

*Names on request.

THE HERTNER ELECTRIC COMPANY
Exclusive Manufacturer of the Transverter
A General Precision Equipment Corporation Subsidiary
12600 ELMWOOD AVENUE CLEVELAND 11, OHIO

is perhaps the most common unit. Measurement of such a quantity may be done by a brightness meter, by photographic methods and by visual methods. Only the latter is a simple, direct method; the others are subject to lengthy labor and, consequently, are rarely used.

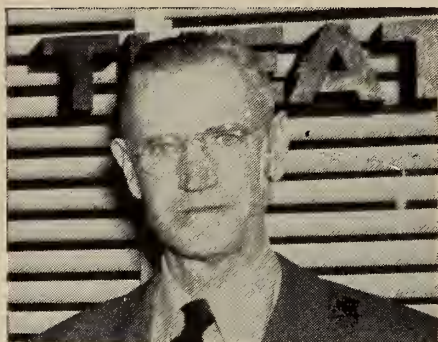
Visibility Measurement

The simplest of the visual devices is the Luckiesh-Moss Visibility Meter which utilizes a two-eye pair of circular photographic gradient filters which use both the gray density and slightly diffusing character of the photographic

emulsion to determine visibility. The filters not only reduce the apparent brightness of the visual field due to absorption but also lower the contrast between the objects and the background.

This meter is based on the assumption of normal vision and a light level of 10 foot-candles on the test object. Therefore it will read higher visibility for more light, which is as it should be. Since the L-M Meter is hand-held, the distance to the object is variable, as is the subtended angle of view. Thus a group of observers using identical L-M meters could never get identical readings at once, as they could not be at the same position to read.

In view of this condition and of the inability of being certain of an individual's handling of such a one-man meter, the use of projected images with controls as to size and lighting is an alternative solution. Such a solution enables the use of a "fogging" light to add general light to the image to unsaturate the colors and thus to add another variable.—*Frontier*, published by Armour Research Foundation.



GLEN D. THOMPSON, Oklahoma City, Okla.—Owner and operator of 15 theatres located throughout Oklahoma—writes:

"RCA Service is a good business investment for keeping my sound systems in fine shape."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.

BOOK REVIEW

TELEVISION: HOW IT WORKS: *A compendium of articles by staff specialists of John F. Rider, leading publisher of books on the electronic art. 203 pages, 8½ x 11½, profusely illustrated. \$2.70. (Available through IP.)*

It becomes increasingly evident that if and when television is utilized in the motion picture theatre field it will be by means of projection-system TV receivers which will magnify and project the image directly to

the screen, as opposed to the costly and involved delayed tele-film system. This being so, it is obvious that projectionists will have to become thoroughly familiar with standard TV receivers such as are now being sold for home use.

This need is met, and admirably, by a recent publication of John Rider entitled "Television: How it Works," which consists of all-new material written by the various experts on the Rider staff. This book was written expressly for TV servicemen; but its content is so lucid and well-organized that it is a "natural" for projectionists. There is nothing in this volume which is beyond the capabilities and comprehension of the competent projectionist.

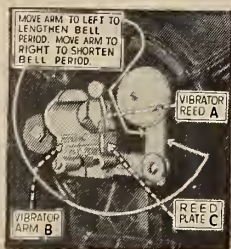
No single book can be expected to convey everything at once, but this book will develop among projectionists a familiarity with TV which, when supplemented by further reading and practice, will place them entirely at their ease come what may in TV developments. The large-page, flat-opening format and extremely legible type and illustrations of this manual is an advantage to the reader.

Opening chapters of this manual discuss the general aspects of TV: how the subject is televised, how the image is built up in the camera, and how the video and sound signals are transmitted and then picked up, separated and reproduced in the receiver. The same progressive lucidity marks all subsequent chapters, which deal with TV channels, signal characteristics, band-width characteristics, frequencies, antennas, followed by eight chapters on the receiver itself. The final section discusses test instruments and trouble-shooting procedures.

The transition from theory to practice, and their reconciliation, is skilfully accomplished, so much so that even he who reads as he runs couldn't possibly escape absorbing much valuable information. For the more serious-minded (which it is assumed includes a vast majority of projectionists who are concerned with their future progress in the craft), this manual most emphatically deserves a "must" listing.

PROJECTIONIST FAVORITES for the "PERFECT SHOW"

REEL-END SIGNALS

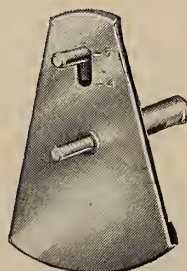


Essannay REEL-END SIGNALS are available for all projectors. Do not touch film or reel, thus eliminating film scratching. Strictly mechanical, require no batteries, no transformers, no governors, and no presetting. Essannay REEL-END SIGNALS can be installed in five minutes . . . can be counted on for years of day-in, day-out, trouble-free service.

UNIVERSAL REWIND MULE

No more delayed shows, due to broken rewind keys and shafts . . . No more fevered dismantling of vital equipment to install new parts . . . No more need for makeshift rewind collars in the projection booth.

Simple, rugged, and positively foolproof, the new Essannay REWIND Drive "MULE" fits any enclosed rewind. A flick of the thumb, and it is set to take 4", 5" and Exchange reels.



ESSANNAY ELECTRIC MANUFACTURING CO. . . 1438 NORTH CLARK STREET, CHICAGO 10

So You Think You Know Something About High-Speed Rotors?

A steel rotor spinning at 633,000 revolutions a second, producing a centrifugal force 430 million times greater than gravity and the highest speed by far attained on earth by man's contrivance, was described recently before the National Academy of Sciences.

The rotor is suspended magnetically in a vacuum and spun by a rotating magnetic field. With the air or gas in the chamber surrounding the spinning rotor at a pressure of only 1/1000th of a mm of mercury (1/760 millionth of atmospheric pressure) virtually all the frictional drag is accounted for by gaseous friction alone.

Rotors weighing 1/50th of a milligram to ten milligrams have been used. The highest speeds and centrifugal forces were developed with rotors 21 mils in diameter. (A mil is 1/1000th inch.) The low frictional drag also makes it possible to drive the rotor in synchronism with a piezoelectric crystal-controlled circuit, which should give the rotor speeds constant to one part in 100 million.

New Strong 1-Phase Rectifier Has Ample Reserve Power

A new 60-to-80-amps, four-tube rectifier for use with high-intensity arcs where only single-phase power is available has just been introduced by Strong Electric Corp. This Type 28910 rectifier has been designed to produce power even beyond the normal requirements of the largest theatres, as well as drive-in-theatres, where enormous screens tax lighting equipment to the utmost.

The maximum operating load is sufficiently below the capacity of the four 20-ampere tubes to result in exceptionally long tube life.

Transformer taps provide adjustment to compensate for line voltage variations from



New Strong rectifier available for drive-in and large enclosed theatres having only single-phase power supply. Wide reserve power provides ample safety factor.

Test film tapes have been run 500 times without breaking, although it is possible to splice them on an ordinary home movie film splicer.

Players can be plugged into the radio, playing the sound through the radio speaker and projecting the film onto a screen above the radio. Other models will have self-contained screens similar to television receivers.

Silver-Sensitized Photo Material

General business and industry, not Hollywood, are the biggest users of silver-sensitized photographic materials. New homes and new babies also have caused a boom in home photography which, in all its branches, uses about 15 million Troy ounces of silver annually.

The most industry-wide and nation-wide use of silver is in the electrical industry, chiefly in the silver tips of "contact points"—unseen, and generally unknown, little gadgets which make-and-break electrical circuits. Though these bits of silver inlay may weigh only a few grains each, the total use of silver in the electrical industry adds up to more than 10 million ounces a year.

ASA Industrial Ventilation Work

Increasing recognition by hygienists and engineers that engineering principles can be used to advantage in exhaust system ventilation to remove toxic fumes and gases has led to the reorganization of the Section

Committee on Safety Code for Industrial Exhaust and Ventilation, of the American Standards Association. In addition, a revision of an existing report outlining fundamentals affecting the design and operation of exhaust systems is now being prepared by a subcommittee, in cooperation with the American Public Health Association.

All those having suggestions to make concerning the development of this project may communicate them directly to the ASA at 70 East 45th St., N. Y. City, 17

2 New Du Pont Eastern Offices

Photo Products section of Du Pont has opened news sales offices in Philadelphia (225 S. 15th St.) and in Atlanta (1115 Candler Building). Each office will handle full Du Pont line including motion picture, industrial, trade and x-ray photo products comprising films, papers, and chemicals.

Get your copy of

Projectionists'

SERVICE MANUAL

and learn what the service man does when the equipment fails to function properly. Compiled in handy book form and attractively presented.

200 to 250 volts, and for full commercial amperage requirements from the largest to the smallest Suprex carbons. The complete electrical and mechanical assembly consists of two transformers, four tube sockets, and a manually-operated current control handle which actuates the 8-point rotary switch employed to increase or decrease the current even when the arc is burning.

Sufficient natural draft through the transformer assembly and past the tubes maintains low operating temperatures. Built in single lamp units for convenience in handling and to provide maximum flexibility in electrical connection, it is regularly supplied for use on 220-volt, single-phase, 60-cycle power. The unit measures 40 x 22 x 14 inches.

Novel Home Sound-Movie Projector

Home sound color movies projected through your radio by a device resembling and operating like a record player was discussed at the SMPE meet. Specially constructed turntable plates receive 12-inch records about 1/2 inch thick which will play 10 minutes of sound movie projected on a standard home projection screen at about 20 feet. Within the player device is a 300 watt pinpoint cold light, control of which determines the brightness of the picture.

The records are metal disks with 1/2 inch lips. On top is a specially cut phonograph record containing sound good for dozens of plays. Sealed underneath is a film tape containing the picture. Once locked together the sound and film remain in synchronization.



Your SILENT PARTNER in the projection room

We are proud of our 22 years of service as "Silent Partners" to the projectionists of America.

You put the show on!

We help you *keep it on*—maintain screen presentation at its best!

Now—as always across the years—you can rely on NATIONAL—in any emergency—24 hours a day if necessary!

When you think of equipment . . . supplies . . . think NATIONAL. We're as near as your telephone—ready and waiting to be of service!

NATIONAL

THEATRE SUPPLY

Division of National • Simplex • Bludworth, Inc.

IN THE SPOTLIGHT

(Continued from page 17)

Lewis was recently tendered a testimonial dinner and banquet by the members of the Local. IA President Walsh, Tom Shea, Fred Raoul, Bill Scanlon, and representatives from many New England Locals were present at the affair and all paid high tribute to Rube's outstanding record as a union official.

- The untimely death of Harry Alexander, business agent of Local 597, Waco, Texas, was a blow to his many friends throughout the Alliance who looked forward to greeting him again at the forth-

coming Cleveland Convention. He was buried with full Masonic honors. We extend our deepest sympathy to the Alexander family.

- Louisville Local 163 voted to send two of its members to the Kentucky Labor School for the two-week course on labor economics, labor legislation, and other related subjects. William H. Fane, secretary, and August A. Ansback, Jr., are the members elected to attend this year's sessions, which will open July 18. Another member, Jesse Hopewell will be sent to St. Louis for a two-week study of the latest television techniques.

- It is quite apparent to students of the labor movement in this country that labor unions are giving a great deal of time and thought to old-age pensions for members who have reached the age of retirement. We are happy to note that a number of IA Locals are seriously considering the inclusion of such a plan in future contract negotiations, particularly in view of a recent ruling of the National Labor Relations Board which held that pension plans are a proper subject for collective bargaining. One large IA Local (for obvious reasons we cannot mention which one at this time) has such a plan under way and will present it to the exhibitors when its present contracts expire.

BRENKERT'S CO.'S 40 YEARS

(Continued from page 18)

this problem by adding onto the barn. Within four years we had the most unique plant in America: 4500 square feet of floor space, divided into eight rooms—and no two rooms on the same floor level! The Brenkert production line at this period was not the longest in the world, but it certainly was the steepest!"

The Brenkerts produced their first theatre-type spot lamp in 1911. It was a floor standard spotlight, complete with rheostat and an enclosed switch of 30-ampere capacity. The first Brenkert lantern slide projector for theatre use was produced in 1912. That was the era

of the illustrated song, and the projectors, according to Karl, "sold like hot cakes."

The period between 1912 and 1921 was devoted to improvement of products and the addition of accessories for their broader use. In 1921 the first Brenkert theatrical scenic effect projector was introduced, and this was followed in 1927 by a greatly improved model known as the F-7, which is now in use in theatres throughout the world.

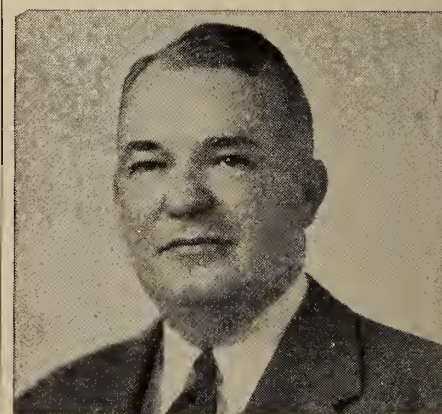
In 1925 the Brenkert firm moved into a modern, fully equipped plant containing 18,000 square feet of floor space.

By 1927 the Brenkerts were looking around for further opportunities and they determined to become more closely associated with the projection of motion pictures. Accordingly, they began the engineering and development of motion picture projection lamps which ultimately resulted in three different types of projection lamps which covered the requirements of theatres of all sizes.

Brenkert Projector Bows in '39

In 1935 Brenkert marketed the present-day Enarc lamp, and the Radarc lamp followed in 1943. Meantime, in 1931, the Brenkerts had begun an intensive study of the motion picture projector. The result was that in 1939 there was introduced the Brenkert motion picture projector.

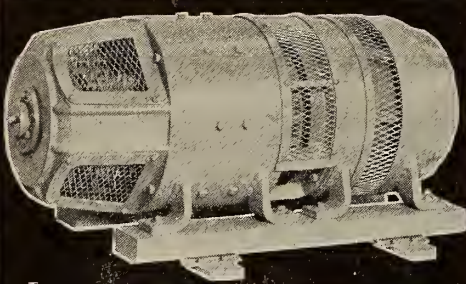
Starting in 1941, RCA assumed responsibility for the selling and servicing of Brenkert projectors and projection lamps, and four years later the Brenkert company became a part of the RCA organization.



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AMERICAN TRADE UNIONS

(Continued from page 7)

union meetings—religion and partisan politics.

The unions, of necessity, must control the membership on all questions of industrial policy and action by the vote of the majority. But to go farther and inject religion or partisan politics would create an active cause for suspicion, division and vigorous discord which would prevent the necessary unity on the industrial field. It is this collective and loyal action on the industrial field which is the principal, and the most important, reason for trade union organization.

The trade union leader who for partisan purposes begins to talk like a politician soon comes to think and act like one—a change which the average American workman quickly senses. Too often they have learned that the usual result of mixing trade unionism with partisan politics is a mess of political pottage and a weakened and disillusioned membership.

They have found that labor's effectiveness in securing required legislation and adequate and proper administration thereof depends upon labor's thoroughgoing political independence.

As to the growth of industrial unionism, time alone will determine the result. Should the AFL continue its departmental structure, and these in turn apply the policy of joint action, through building trades and metal trades local councils and railway shopmen's organizations, then the skilled craftsmen will continue to maintain virile, effective trade unions to protect them.

If skilled craftsmen, members of CIO industrial unions, find insufficient protection and discover that a majority composed of the semi-skilled and lesser skilled prevents them from securing adequate recognition and protection, then in all probability history will repeat itself. In fact, it is already doing so, for in some of the mass production industries controlled by the CIO it has been found necessary to give the highly skilled members separate local unions of their own, with their own delegates seated in the conventions.

This review of trade unionism for the past 2,700 years comes to a close. It does not assume to be a full and complete record, for such a history is impossible. The writers of antiquity, upon whom we must depend for sources of information, failed to give us more than brief references to the trade unions movements of their day.

History, however is clear and definite on some facts. Trade unions existed only where the workers were free men; as free men and trade unionists they were always the bulwark defending the principles and the methods of democracy.

From the beginning the trade unions developed fraternal and religious features. They sought to organize all of their crafts or callings without any religious or racial barriers.

As craftsmen they gave particular and continuous attention to the thoroughgoing training of apprentices—the future craftsmen. They were active in legislative matters, but avoided partisan political organization. And from the beginning the craftsmen never hesitated to use one of their most powerful weapons—the refusal to work when the conditions of labor became unsatisfactory.

[Ed.'s Note: This is the concluding installment in a serialization of the book "Craft Unions of Ancient and Modern Times," published privately by the author. This little book, while admittedly not all-inclusive, serves admirably to impart a general understanding of the antecedents, the growth and the present status of the Labor movement.

Certain statements made by Mr. Frey in his book must be viewed in the perspective not only of the passage of time since it was written (three years ago) but also of the author's long and influential position in the AFL. This last installment is a case in point: the AFL sustained a severe jolt in terms of total membership through the recent defection of the United Mine Workers, even as the CIO made wide gains in the mass-production industries.

On the score of political activity by Labor, one must be careful not to read the word "partisan" (support of a particular political party) into an organization such as the AFL-sponsored League for Political Education, which will acquaint AFL members with legislators' voting records *irrespective of party*.

IP expresses its thanks to Mr. Frey for

his gracious permission to publish this series, and it is sure that its readers share the feeling that it is an absorbing, instructive and altogether noteworthy contribution to the literature of the Labor movement.]

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harmony of color tone and
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NEW YORK, N. Y.

MONTHLY CHAT

(Continued from page 3)

were made? No, not just now, was the reply, as he didn't wish to give "my competitors an edge." IP would simply have to take his word for it.

When informed that IP would not under any circumstances publish such stuff, the manufacturer magnanimously offered to "sign the article myself"—as though such mental convolutions relieved IP of its responsibility to edit both signed and unsigned material appearing in its columns.

Finally convinced that the material would not appear in IP, the manufacturer fumed, threatened that there would be "no advertising" and promised that we would shortly see it printed elsewhere in the industry press. We did, too, in two papers. Edited, of course, but not enough to hide the untrue performance statements and the unfair competitive digs.

Now, IP poses as no paragon of all the virtues, and it admits that it has been sucked in upon several occasions the remembrance of which served to sharpen its wariness. But IP has never succumbed to this "talk turkey" gab nor been cowed by an "or else no advertising" approach. Its boners have been pretty much on the honest, if not the smart, side. Nor is IP trying to convey the idea that other papers in this field are strictly on the venal side. No, indeed; they're just a bit fluffy on technical matters and more than a bit uncautious.

The guy who needs to be slapped down is that character who promotes a product "under the table," so to speak, with no proof of performance claims and no warrant for unfair slaps at a competitor, the whole backed up by a few bucks of advertising-money salve. Such a fellow should welcome constructive criticism of an equipment which ultimately might prove to be a dud.

Performance Proof Essential

There are many ways in which to ethically promote a product, but making fantastic claims for performance and slashing at a competitor are not ethical. In this feverish field of motion picture equipment there are some prize examples of how not to promote a product. Certain manufacturers, not content with making absurd claims for their own stuff, jump the fence and point out how their equipments will compensate for the deficiencies in another, and sometimes unrelated, unit. Equipment users are not interested in such guff; what they want to know are such things as how many lumens a unit will deliver, or how many watts output, or how sturdily it is built, or how economical it is to operate and maintain—in short, how well it does the job for which it was designed.

Moreover, when a manufacturer makes certain claims for his product he should be ready and willing to back up those claims with irrefutable performance data.

One may honestly think that his is the best product, but when he sets about making comparative statements, or when he hops over the fence to cite an operating limitation of any other unit of the projection process, he should be made to prove it. "Private test data" is strictly the malarkey. What everybody wants to know is how it delivers in the field under actual projection room conditions.

On the score of those trade papers which print verbatim manufacturers' handouts, the remedy is simple: competitive manufacturers should instantly and firmly press for proof of the statements made.

The crux of this matter is the multiplicity of widely varying products—representative of the mechanical, optical, chemical and electrical arts—which enter into the projection process and the slightest deviation in performance of which seriously affects the final result. This circumstance encourages much loose talk about given units of equipment.

The complexity of the process, however, is no excuse for the meek acceptance by trade paper editors of any manufacturer's handout that is dumped on their desks. On the contrary, it imposes on the editor an obligation to check and recheck to the end that accuracy be served and, in the case of competitive statements, fairness be observed. After all, complex as the process is, no single element therein, whether equipment or technique, is so involved as to prevent ready explanation by the numerous specialists who grace the projection field. Somewhere there is the fellow who *knows*, and it is the editor's job to reach that fellow.

As for IP, these shenanigans irritate

but do not worry us unduly, because IP is in a somewhat different position from the other papers in this field. IP welcomes advertising, of course, but if it didn't run a single paid line of type it still would go along because it draws its strength in the main from its readers, the people whom it was intended to serve—and does.

PERSONNEL

MARK S. HOBAN, previously associated with leading radio companies such as Federal, Philco and Crosley, has been appointed factory manager of Century Projector Corp., effective immediately.

E. W. McCLELLAN, assistant chief engineer of Westrex Corp., has returned to New York headquarters after a three-month round-the-world trip, entirely by air. In introducing new techniques and testing equipments, McCLELLAN found that American technical papers are followed avidly by foreign engineers despite language barriers.

ARTHUR E. GAVIN, formerly editor of *Home Movies*, has been appointed editor of *The American Cinematographer*, with ESTHER TOW, formerly director of Functional Arts Research Bureau, as assistant editor and director of the new public relations program. WALTER R. GREENE, resigned as editor, will engage in a private business venture.

REEVE O. STROCK, recording manager for Westrex, is in England to supervise W. E. recording activities there for the next four months. He will substitute for R. J. ENGLER, who is in the U. S. for home leave.

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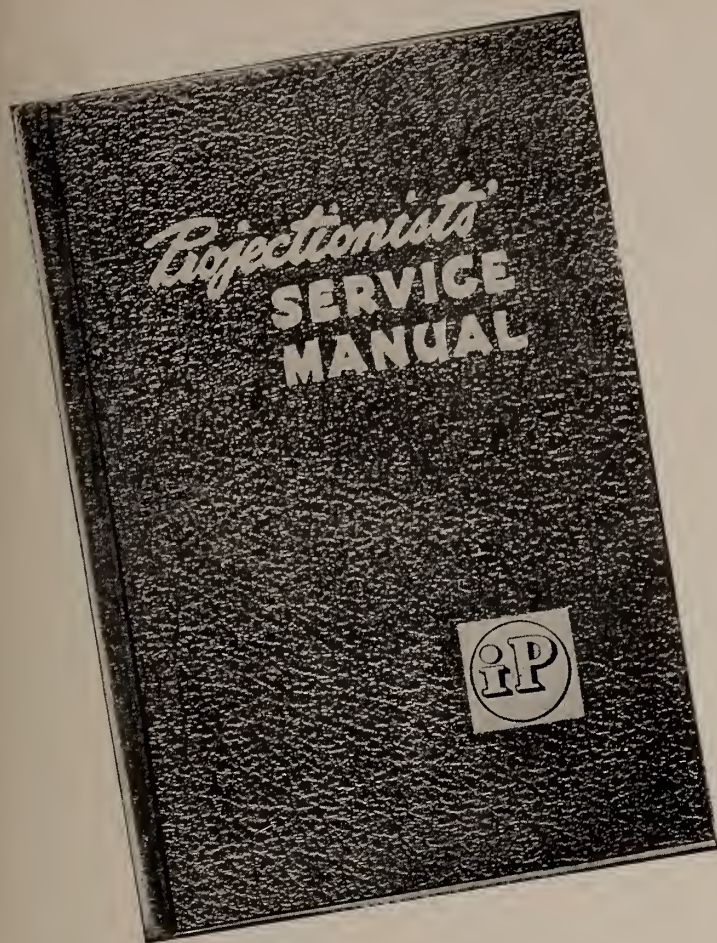
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complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right—only \$3 per copy, postage prepaid.

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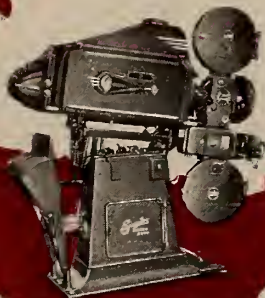
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AUGUST

1948

VOLUME 23

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NUMBER 8

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2.
He's moving into his dream house in 1958.
3.
He's going to get \$4 back for every \$3 he invests today, after 10 years.
4.
He's helping his country and himself, at one and the same time.



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AUG 23 1948

INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING



HENRY B. SELLWOOD, *Editor*

Volume 23

AUGUST 1948

Number 8

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MONTHLY CHAT

NO board of inquiry need be named to uncover the facts relating to the intolerable physical condition of film prints that theatre projectionists are being asked to project these days at great personal hazard and to the discomfiture of the paying patron. One need only turn to the *In The Spotlight* section of this issue and there find spread upon the record in fulsome measure—by exchange people themselves, incidentally—the chronicle of the intolerable conditions existing in exchange centers today.

Nor do even these frank statements tell the whole story, since the exchange people understandably are reluctant to beef about their brother-union members, the projectionists, no less than to spread over the printed page the whole story of their plight.

But from their statements emerge certain facts that will be apparent even to he who reads as he runs: the brutal working conditions compounded of low wages, skeleton crews, cramped working quarters, the speed-up system—not to mention bum shipping cases and reels—which make a mockery of a vitally important physical operation of the world's fifth largest industry.

If the exchange workers be too impotent to extricate themselves from these sweatshops, the projectionist craft should cooperate to the fullest to alleviate these foul conditions, if only on the basis of enlightened self-interest. You're the fellows who have to run this junk and who ultimately will take the rap for any "un-toward happenings" in projection rooms.

No slide rule is needed to figure this one out. These exchange workers need a lift.

* * *

AN encouraging sign of recent months has been the re-establishment of the close relationship between manufacturer and projectionist which existed for so many years up until about 1940. We refer to the numerous recent demonstrations of his product staged in every section of the country by one of the more enterprising purveyors of equipment.

This particular fellow was a noted fighter of yesteryear, by which we mean that he got close to his real customer, the projectionist who used his stuff, and hammered home the strong points of his units. However, for all too long a spell now he, like practically all his colleagues, has been content to make and sell his product at very long range.

Maybe the lush business of the war years was the determining factor in the very apparent deterioration of close contact between maker and user of projection equipment. Whatever the reason, events have proved that the manufacturers were dopes to sever the ties that

(Continued on page 26)

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Whither the Motion Picture Theatre?

NO more important issue confronts the motion picture exhibition field—meaning *you*, Mr. Projectionist—than the *probable* effect of television upon the theatre box-office. We deliberately chose the word “probable” because events of the past couple months seem to IP so persuasively indicative of what will happen in succeeding months, on a much larger scale as the video industry expands, as to be crystal-clear to all save the *manana*-boys and those who for no-good and insufficient reasons prefer not to face the matter squarely.

Aware of the fact that there are almost as many differing opinions anent this topic as there are prognosticators, IP still adheres to its opinion of long-standing that Tv will prove to be box-office poison. The basis for this opinion is provided by the appended summary of the general situation.

First, a word about the production end of the movie industry. That these fellows will do all right no matter what befalls the exhibition field is apparent in view of the frantic rush by producers, players and technicians to board the video bandwagon. This development was inevitable because of Tv's voracious appetite for film product. Hollywood can't lose, come what may, and they may be expected to abandon the exhibition field whenever their interests are served by so doing. Naturally.

With Tv receiver sales reaching for the two million mark right now and with a coast-to-coast video network expected to be available within little more than a year, the head-on collision of the two pictorial arts will occur much sooner than is generally anticipated—at least early enough to occasion considerable brow-wrinkling *now*.

In any event, nobody with the least

degree of perception sees the motion picture theatre continuing to operate as presently constituted. Just what form exhibition will assume is anybody's guess, but the movie theatre adherents in general fall into the following slots:

1. Those who envision a straight Tv theatre served by programs especially prepared for and transmitted to the theatre over a closed circuit.

2. Supporters of a combination motion picture film-Tv program, with the video portion consisting mainly of special events, whether in the political, sporting or straight news realms.

3. Those who, counting upon the “novelty of Tv wearing off,” rely upon the natural gregariousness of humans to fill movie theatres. As one lover of his own phrases, with utter disregard for their meaning, puts it, “The only thing that will keep the American public at home is a broken leg.” If this be so, even right now broken legs must be endemic in American homes.

'Novelty' Tag Proved False

Considering the last group first, every survey taken to date, including those embracing Tv set owners of five-years standing, proves *conclusively* that the “novelty” of Tv programs decidedly has not worn off; on the contrary, Tv not only holds but continues to strengthen its grip upon its devotees. These are *figures*, not *opinions*.

Another segment of Group 3 points to the continuing, even increasing, attendance at ball parks, dog tracks, the opera, *etc.*, as evidence that the televising of such events has helped rather than hurt the box-office. This argument ignores the fact that in one instance the appeal is as between the pictorial and the actual performance itself—in short, flesh shows—while in the other instance it is

a case of *both* mediums being pictorial. Still, the minor baseball league teams are up in arms about the telecasting of big-league games from *adjacent metropolitan areas*.

A combination motion picture-Tv program in a movie theatre poses many problems. First, there is the very tough problem of programming, precise timing being required. Second, the Tv portion of the program must differ from that being telecast into the home. Why pay to see that which one may see for free? Moreover, the Tv stations have demonstrated conclusively that they will never permit any pickup of their programs, and this bar will exist except for those few events which may be regarded as being in the public domain—the same program that goes to the home.

As for sporting and other events, motion picture theatres will have to bid competitively against both the Tv stations and the giant advertising bankrolls of sponsors. Money will talk, and how, in this circumstance.

Much loose talk is heard about the delayed-projection method (recording the Tv image on film for subsequent presentation) and the direct-projection method (instantaneous presentation of Tv images). Apart from the terrific extra cost for equipment, transmission facilities and other corollaries to either of these methods, it so happens that the motion picture *exhibition* field doesn't have a transmission channel, or even a radio relay hookup, to its name. And nothing is being done about obtaining any—not surprising in view of the present unsympathetic attitude of the F.C.C.

IP holds that the only possible chance for a survival of present motion picture theatres lies in presenting super-duper motion pictures of such terrific appeal—color, stereophonic sound, three-dimensional pictures—in such swellegant surroundings as to literally drag the customers out of their homes to the theatres. The effort involved in this operation

(Continued on page 28)

NOTES ON PROJECTOR MAINTENANCE

By ROBERT A. MITCHELL

THE printed forms which distributors frequently enclosed in film cases during the war and for a short time thereafter urgently requested projectionist cooperation in the conservation of prints by keeping projectors clean and "properly adjusted" at all times. No specific advice was attempted, and rightly; the projectionist may be assumed to know more about projection than anyone else.

One of the hallmarks of good projection is its unobtrusiveness: it does not vie with the picture itself for the attention of the audience. Let something go wrong—a miscue on the changeover or a sound outage—and the audience becomes aware of projection. The craft may be proud of the fact that the projection process, as such, is seldom noticed by the theatre patron.

Obviously, no machine, whatever its function, will operate satisfactorily if any of its parts are worn, damaged, or maladjusted. Service projectionists who are called upon to operate in a number of different theatres cannot help but notice that in many cases projectors of the same make and model "behave" and "feel" differently. Some projectors are quiet in operation, while others are excessively noisy. Some project a hazy, unsteady picture, and others give entirely satisfactory results.

Skill in the adjustment of a piece of

machinery as complex and delicate as a motion picture projector requires something akin to a sixth sense—the product of experience only—and this skill is a vitally important element in projection work. There are any number of "kid operators" who can run a show after everything has been fixed up shipshape for them, but we all know how helpless they are when something goes wrong, as often happens when inexperienced projectionists are employed.

"Inspecting" and "testing" are the watchwords of the careful projectionist. Time is money, and a good way to save time is to examine projector parts closely when cleaning and oiling. Gear teeth should be checked for wear, screws and taper pins for tightness, and springs for proper tension.

Inspection, Testing Watchwords

In a certain make of projector the screw that holds the spiral shutter gear is likely to work loose and cause excessive backlash in the shutter. The holdback-sprocket gear of a certain make of sound-head needs to have its taper pin tapped in occasionally. It does not take a projectionist long to locate the weakest points of his equipment.

The condition and adjustment of the takeup assemblies, the all-important intermittent units (are the cover screws tight?), the timing of the shutters, the

condition of the motors and motor controls, are among many other matters which the projectionist cannot afford to ignore, even for a day. There is rarely a good excuse for anything going radically wrong during a show. A single worn gear or misaligned sprocket idler endangers not only the show but the film and even the equipment itself.

Don't rely upon guesswork in making repairs: apply directly to the manufacturer for instruction manuals. A careful study of the instructions, and a comparison of the diagrams with the actual equipment, help immeasurably.

Stripped gears bedevil all projectionists. Such accidents may happen at any time, but periodic inspecting and testing undeniably minimize the danger to the vanishing point. The various emergency measures which have been frequently suggested for keeping the show going in the event of damaged gears are small comfort. While it is true that some of these measures are mechanically sound, others are strictly haywire.

No practical projectionist will ever brag about his ingenuity in "doctoring" stripped gears, for he will have exercised sufficient foresight to obtain spare main drive, fiber spiral shutter, and other gears likely to strip long before the need for them arises.

Because of the large variety of makes and models of projectors in use, the appended inspection-routine data cannot be made as specific in some particulars as might be desired, but it is hoped that all of it will be found in some respects suggestive and helpful.

A. THE UPPER MAGAZINE

1. *Reel-spindle shaft.* Place an empty 2000-foot reel in the upper magazine and turn it, pressing in on the outer circumference slightly. If the reel scrapes against any part of the magazine enclosure, the shaft should be removed for further inspection. If worn, replace with a new shaft.

2. *Reel key and jack.* Replace worn keys.

3. *Check tension.* If film-slapping occurs in the upper magazine during normal operation, remove the shaft, clean and reoil it, and provide greater spring tension.

4. *Nuts holding magazine to head.* Tighten if necessary.

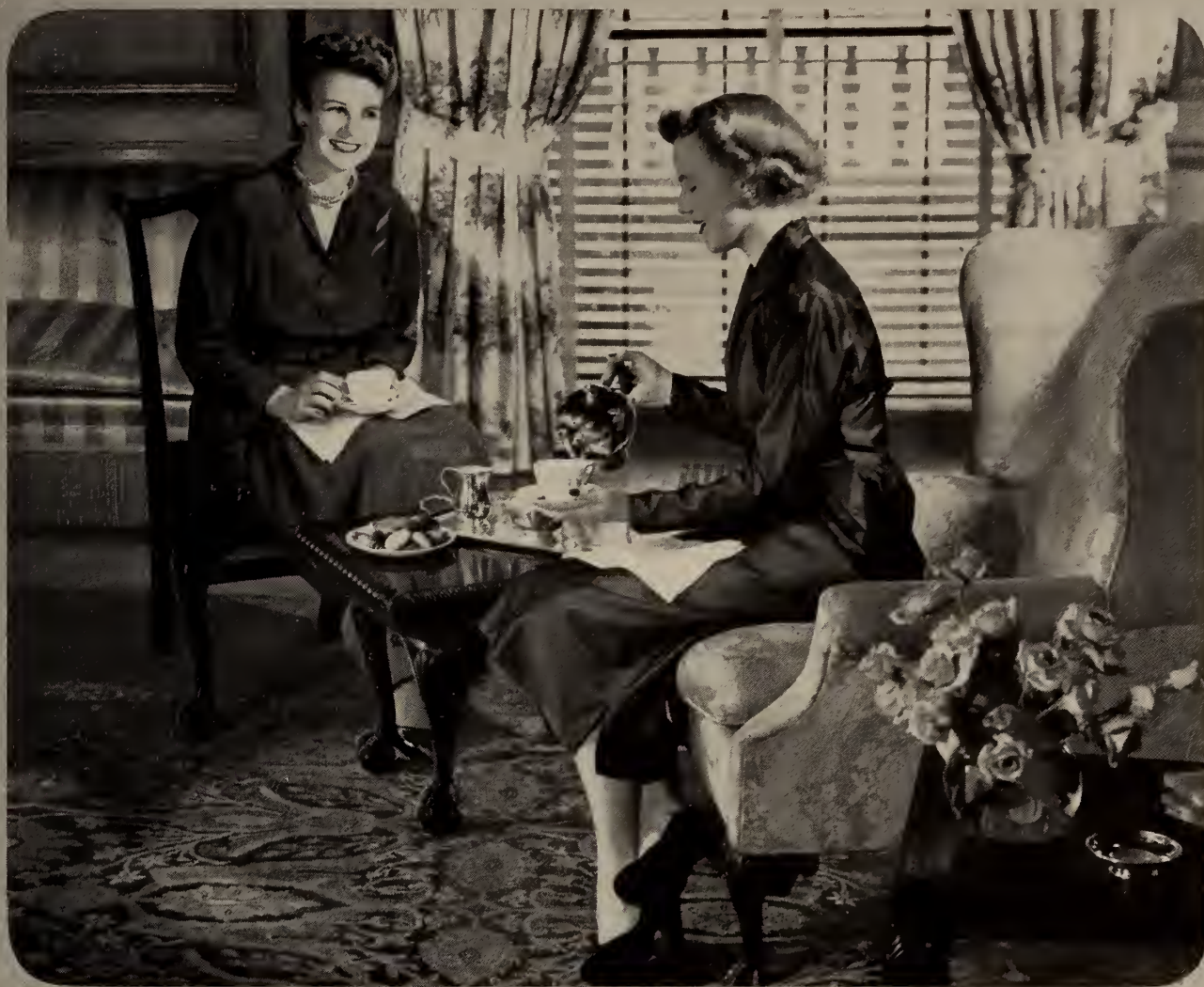
B. UPPER VALVE ROLLERS

1. *Check rollers for free turning.* The rotation of both fixed and drop rollers should be unimpeded by dirt. To accomplish a thorough cleaning job, remove the upper magazine.

2. *Check rollers for wear.* Replace rollers having "flats". They scratch film.

C. UPPER FEED SPROCKET, PAD ROLLER

1. *Check sprocket for dirt and wear.*



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Swing stripper out of the way to remove large accumulations of dirt. Clean sprocket teeth with a stiff toothbrush dipped in kerosene. Hooked teeth are detected by examination with a strong magnifying glass or dental mirror, or by passing a knife blade over the underside of a tooth, a "click" indicating a notch. Reverse or, better, replace sprockets having worn teeth.

To replace an upper feed sprocket in many types of heads, remove upper magazine and valve-roller assembly and proceed as in 2, following.

2. *Alignment of sprocket.* In most makes of projectors the upper feed sprocket is properly aligned when brought up snugly against the bearing face. In others the lateral position of the sprocket is located by reference to a machined surface adjacent to the bearing. In almost any case remove the upper magazine and valve-roller assembly. Open or, better, remove the pad-roller assembly. Swing stripper out of the way. Loosen sprocket set-screw and make the lateral adjustment with extreme care, following the manufacturer's instructions. Tighten the set-screw securely. Replace stripper and fasten its stud retaining screw. Align pad roller as in 3, following.

3. *Alignment of pad roller.* Using a foot or so of new film, thread up the upper feed sprocket. Open and close the pad roller several times rather sharply. Remove the strip of film and examine its edges at the place where it was on the sprocket. If an edge is nicked or roughened, loosen the set-screw and move the pad-roller arm in or out, as required, and tighten. Repeat the test until a position is found where the edges of the film are not injured.

4. *Clearance of pad roller.* Loosen the locknut of the pad-roller stop-screw. Thread the sprocket with two thicknesses of film and close the pad roller. Adjust the stop-screw until the point is reached where the two thicknesses of film are only very slightly loose on the sprocket with the pad roller closed. Then tighten the locknut.

D. LATERAL GUIDE-ROLLER ASSEMBLY

1. *Check flanges for wear and damage.* Spin the flanges rapidly with the finger. This test, though crude, often reveals a bent flange which has been causing sidesway. If guide rollers are ever accidentally dropped upon the floor, they should be replaced with new ones. Examine the inner surfaces which contact the film. Replace if deep scratches or scoring are evident, for either causes sidesway in the picture.

2. *Check guide rollers for adjustment.* Improper lateral adjustment is indicated if the margins of the picture area of the film consistently show on either the left or right-hand edge of the screen. Loosen

the stop-collar and readjust, using picture-centering test film, if such be available. Also notice whether both guide-roller flanges revolve during normal operation. If they do not, scoring is inevitable. See item 4.

3. *Guide-roller pivots.* The guide rollers must be held in place very tightly by the pivots—this will not prevent their revolving. Loose guide rollers may cause an unsteady screen image. Be sure the pivot set-screws are tight to avoid danger of the entire assembly slipping out of the projector. When removing pivots, guard especially against their pushing out and dropping into the mechanism!

4. *Guide-roller spring.* If the film-course is known to be perfectly lined up, but the film persists in "pinching out" at the lateral guide rollers, the spring may have too much tension. Remove the entire guide-roller assembly, take it apart, and cut away a few turns of the coil spring. Before reassembling the unit, thoroughly clean and lightly oil every part.

E. GATE, APERTURE, AND GATE DOOR

1. *Check film tracks for wear.* Place a short, accurate steel straight-edge against one of the film tracks and direct a flashlight beam *behind* the straight-edge. A hollow in the track will thus be revealed. Repeat the test on the other track. Also scrape a sharp-edged copper coin lightly across each track in a lateral direction. A "click" will indicate grooving. Hollowed or scored tracks should be replaced at once.

(Important: Greater skill is required to detect worn tracks on modern projectors having lateral guide tracks.)



Sound breakdown is overcome by the Altec AA 1000 emergency amplifier which, clipped to the p. e. cell leads and the lines running to the speakers, enables sound resumption within one minute. Capable of serving even the largest theatre, this hookup may be left connected in regular service indefinitely.

2. *Aperture plate.* Remove the aperture plate and carefully examine the aperture. If it shows traces of having been filed out of shape, install a new aperture plate in each machine. (Specify the standard aperture dimensions 0.825 x 0.600 inch, corners rounded or square.) Aperture-plate shims must hold aperture plates tightly. Shims may be bent with the fingers.

3. *Check gate-door tension pads for wear.* Remove the door from the machine and examine the pads under a good light and with the steel straight-edge. Worn pads may cause in-and-out-of-focus effects.

4. *Check pads for tension.* Press upon the pads with the fingers. The sense of touch will reveal whether or not the tension is even and adequate. The set of pads at the aperture should exert slightly greater pressure than the upper set or sets. Remove the pads to clean out the dust which is apt to lodge underneath them. In many makes of projector the pads may be removed without the necessity of separating the door proper from the door holder.

5. *Alignment of intermittent shoe.* This touchy item warrants careful attention. With no film in the projector, open the gate and switch the projector motor on. Listen to the intermittent. Now very slowly close the gate with the machine still running. If a loud intermittent sound begins to be heard, adjustments are necessary.

Remove the gate door and loosen the screws (usually three in number) that hold the door and door holder together. Alter the position of the door relative to holder in the proper direction, tighten the screws, and test the gate again. A position will be located that gives a minimum of intermittent sound. Remove accumulations of dirt and emulsion from the shoe with a toothpick or copper-wire probe.

6. *Gate-door apron.* The correct position of the apron is such that, when no film is in the projector, the intermittent shoe rests lightly but firmly against the face of the intermittent sprocket. If the shoe fails to bring up against the sprocket, little can be done except to obtain a new gate. Do not attempt to bend the apron! When ordering, do not fail to supply the dealer with the serial number of the projector head.

F. AUTOMATIC FIRE SHUTTER

1. *Check governor or centrifugal device.* All parts of the fire shutter must be kept scrupulously clean and lightly lubricated at all times. The action of the device should be checked frequently by observing its lifting and dropping as the projector speeds up and slows down.

(Continued on page 29)

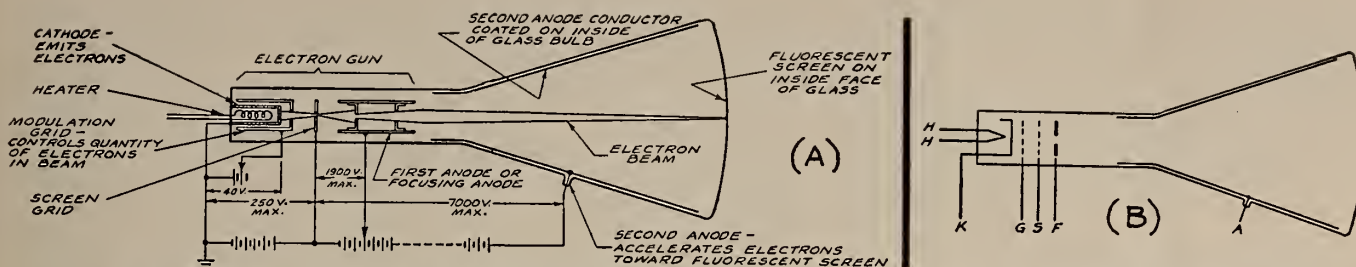


FIG. 5. The different elements of a picture tube are shown in (A) with typical operating voltages. (B) shows a common schematic representation of this tube: K is the cathode, G the modulation grid, S screen grid, F focusing anode, and A the second anode.

TELEVISION: How it Works

By WILLIAM BOUIE

The second of a series of articles anent the fundamentals of television, particularly in terms of image propagation and reception. This series constitutes only one chapter in the book "Television: How it Works" just brought out by the noted publisher of electronic works, John F. Rider.

WE have already seen that a complete television (Tv) system, like a complete broadcasting system, requires a pickup at the transmitter and a reproducer at the receiver, and that the pickup is a photoelectric tube and the reproducer is a cathode-ray tube similar to those used in oscilloscopes. To avoid confusion of trade names, let us call the pickup a "camera tube" (it "takes" the Tv picture) and the reproducer a "picture tube" (it reproduces the picture). We shall consider both these tubes.

Essentially, the Tv picture tube is similar to the familiar cathode-ray oscilloscope tube. Let us assume that Tv (video) signals are coming into a receiver: the amplitude of these signals is proportional to the light reflected by the object being televised. We want to use these signals to produce a picture.

In sound work we know that the signals can be made to move a loudspeaker diaphragm, thus producing sound waves similar to the original. The picture tube, then, must be capable of converting the electrical video signals into *light* to produce a picture.

Anatomy of a Picture Tube

Certain fluorescent materials will glow when they are struck by a beam of electrons, and the more electrons striking such a substance at a given instant the brighter will be the glow. A picture tube, then, can be made if we have a source of electrons, means for controlling their motion and their quantity, and a fluorescent screen.

A typical picture tube is a glass vac-

uum tube specially shaped to withstand the high pressure exerted by the surrounding air, due to the high vacuum within the glass envelope. Picture tubes should be handled with great care. Even scratching the glass or careless handling may cause them to collapse as violently as if they exploded.

The white appearance of the large end of these tubes is caused by the film of fluorescent material deposited on the inside surface; this, of course, is where the Tv pictures are formed.

A cross-sectional view of a picture tube is shown in Fig. 5. As in the usual radio tube, the heater causes the cathode to emit electrons, and the second anode (like the plate of the ordinary tube) strongly attracts them, giving them a high velocity. The modulation or control grid regulates the number of electrons which pass through it in a given time.

In the picture tube, additional elements such as a focusing anode form the electrons into a narrow beam so that they will strike the fluorescent screen in a small round spot; in some tubes a screen grid is inserted between the modulation grid and the focusing anode to prevent the focusing action from affecting the modulating action. Fig. 5 (A) shows the general arrangement of parts inside the tube, and Fig. 5 (B) shows a common way of representing these in schematic form.

Forming the Picture Image

With the parts thus far mentioned, the tube can produce a beam of electrons which will hit the center of the fluorescent coating on the inside of the picture

tube and produce a small spot of light which can be seen through the glass end.

We can focus this spot by varying the potential on the first (focusing) anode, and we can vary its brightness by applying a suitable potential to the modulation grid. The more negative the modulation grid becomes relative to the cathode, the dimmer the spot becomes; the less negative the grid, the brighter the spot.

It now remains to provide some means for moving this spot rapidly enough over the fluorescent screen to give us a complete picture—in other words, to provide scanning.

Two methods of deflecting the electron beam are now commonly used: *electrostatic* deflection and *electromagnetic* deflection. The first of these methods, which is probably the simpler to understand, takes advantage of the familiar fact that particles of matter having *like* charges of electricity *repel* each other, while particles having *unlike* charges *attract* each other.

Since the electron beam consists of negative charges, we see immediately that the beam can be deflected by means of suitably shaped electrodes which are charged either positively or negatively as required. In picture tubes, as in oscilloscope tubes, this is done by building into the tube two pairs of metallic plates, arranged approximately as seen in Fig. 6.

This figure shows that plates H_1 and H_2 are parallel to each other but in a plane at right angles to plates V_1 and V_2 . If no potential is applied to any of these plates, the electron beam will pass straight along the axis of the tube and occasion a spot on the screen at A.

Now, if we leave plates H_1 and H_2 alone but make plate V_1 positive with respect to plate V_2 , plate V_1 will tend to attract the negative electrons which make up the beam, thus causing the beam to bend so that it strikes the screen at a new point, say, at point B. We have thus deflected the beam upward in a vertical direction a distance AB.

Similarly, if we leave V_1 and V_2 alone

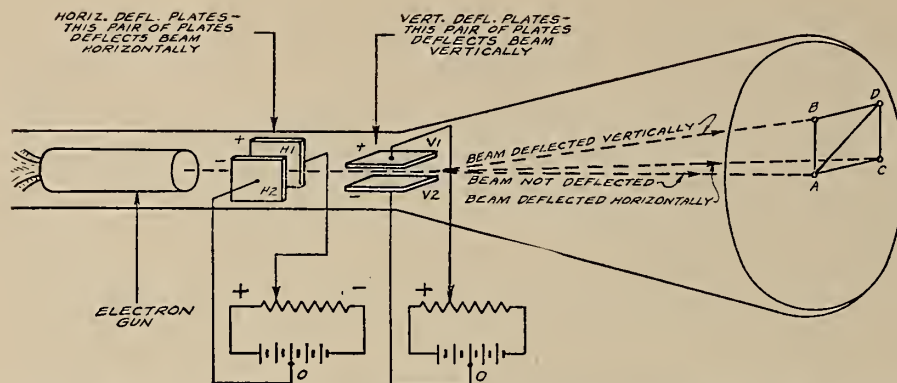


FIG. 6. The electron beam in this picture tube is electrostatically deflected by the two pairs of plates. H_1 and H_2 deflect the beam horizontally, and V_1 and V_2 deflect it vertically.

but make H_1 positive with respect to H_2 , H_1 will deflect the beam horizontally to the right until we get a spot at a point such as C.

If we combine these effects by making both V_1 and H_1 positive at the same time, the beam will bend sidewise and upwards, causing the spot to appear at D. If the potentials of V_1 and H_1 have been the same as used in the first two tests, D will be located so that the distance AD is the hypotenuse of a right triangle whose sides are equal to DC and AC.

Naturally, if V_2 is made positive with respect to V_1 , the beam will be deflected vertically downward; and if H_2 is made positive with respect to H_1 , the beam will be deflected horizontally to the left. The whole process of electrostatic scanning is simply a matter of varying the potentials on the deflecting plates in the picture tube so that the spot on the screen traces out the desired picture according to a regular plan.

Electromagnetic Scanning Method

The second method of deflecting the electron beam is called electro-magnetic deflection, because coils of wire carrying current act on the beam the way a magnet would. See Fig. 7 (A): the magnetic lines of flux from a permanent magnet pass from the north pole (N) to the south pole (S); the electron beam passes between the poles. If the magnet were not present, the beam would produce a spot at point A on the screen. When the magnetic field acts on the beam as in Fig. 7 (A), however, the beam is deflected vertically upward to produce a spot at point B.

Compare this effect with that produced by the electrostatic field in Fig. 6 and you will notice that in the latter the electron beam was deflected in the direction of the lines of electrostatic flux existing between plates V_1 and V_2 , whereas in the case of magnetic deflection, the beam is deflected at right angles to the lines of magnetic flux. Thus in Fig. 7 (B) the beam is deflected horizontally to the right, when another magnet is introduced whose influence is at right angles to the one shown in Fig. 7 (A).

Of course, a permanent magnet gives a steady field and would therefore produce a constant deflection, whereas in Tv we must be able to vary the extent of the deflection from zero to maximum in various directions. Since we can also produce a magnetic field by passing a current through a coil, and, in addition, can vary the strength of the field by

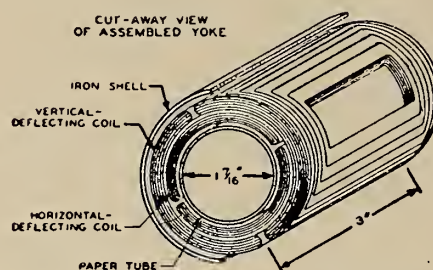


FIG. 8. The magnetic deflecting yoke contains the horizontal and the vertical deflection coils as designated here.

varying the current, we use coils for electromagnetic deflection, as shown in Fig. 7 (C) and (D).

Two pairs of coils are used, and these are often combined in a single compact cylindrical unit called a "deflecting yoke". Fig. 8 shows an RCA yoke.

A point to remember about deflection systems is that when one tube has elec-

trostatic deflection, a change of voltage on the deflecting plates is required to move the beam; whereas in electromagnetic deflection, a change of current through the deflecting coils is required.

Recently it was discovered that a metallic film placed over the luminescent material on the inner surface of the Kinescope tube improved the distribution of light over the screen. This metallic film is in the form of an aluminum backing which acts as a reflector.

In operation, the electrons pass through the aluminum and strike the luminescent material causing it to fluoresce in the usual manner. However, very little light is lost within the tube because of the reflecting properties of the aluminum surface. The result is a gain in the brightness of the received image. This new type of Kinescope is used extensively in new models of Tv receivers.

Camera Tube Components

Whereas the picture tube contains a fluorescent screen to convert electric current into light, the camera tube contains a photosensitive screen to convert light into an electric current. The essential parts of a large tube are shown in Fig. 9: these are the mosaic, the signal plate, the collector and the electron gun. The important accessories external to the tube are the lens, the deflecting yoke, and the load resistor.

The mosaic consists of millions of individual photosensitive globules like metallic droplets deposited on one side of a thin sheet of mica. Each globule is like a minute island on the mica, so that they are insulated from each other. On the other side of the mica there is a layer of conducting material—the signal plate.

Because the globules are separated from the signal plate by the mica, the mosaic consists of a myriad of mica-dielectric capacitors, all having one plate in common. Fig. 10 shows in a general way what the mosaic looks like when viewed from the edge and enormously

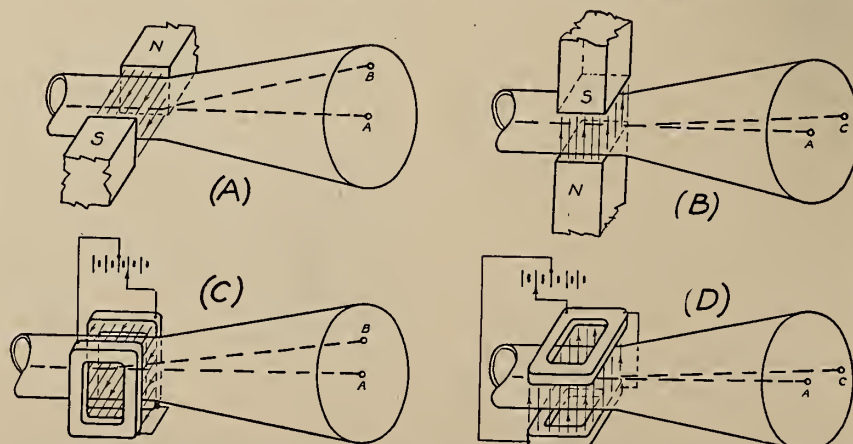
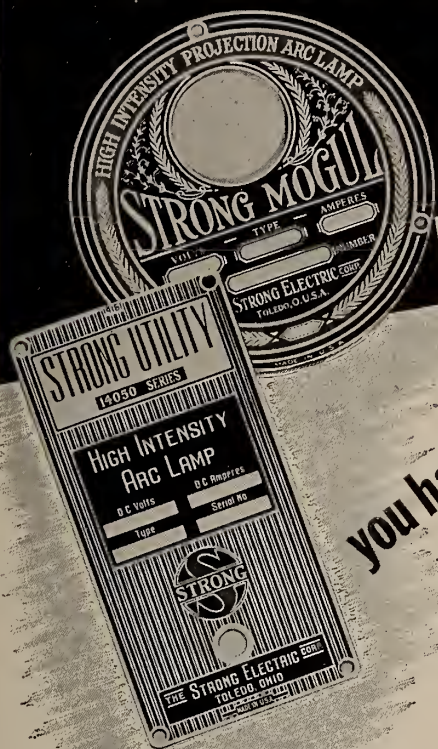


FIG. 7. The magnetic deflection coils in C and D provide a magnetic field similar to that of the permanent magnets in A and B. Note that beam is deflected at right angles to lines of force.



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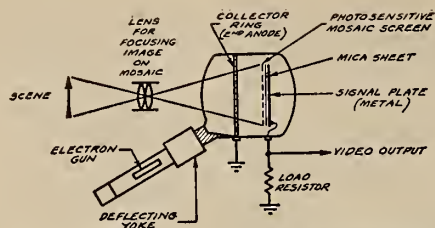


FIG. 9. Elements of the large tube are easily identified. Light images formed on the signal plate are transformed into electrical energy by the scanning beam.

magnified. The collector ring is a metallic coating applied in the form of a ring around the inside of the tube and also extended down the neck of the tube near the electron gun.

Briefly, the action of the Iconoscope is as follows: an optical image of the scene to be televised is focused on the mosaic by the lens. The electron gun projects a stream of electrons over the mosaic, scanning it under control of the deflecting yoke, as already described in connection with the picture tube.

The electron beam in traversing the mosaic causes a succession of voltages to appear on the signal plate which are proportional to the distribution of light in the image of the scene. The resultant current which flows in the load resistor causes a voltage drop. This constitutes the *video signal*. This signal is then amplified and used to modulate the Tv transmitter.

Iconoscope Action Detailed

Here is a more detailed description of Iconoscope action: when a scene is focussed on the mosaic, each photosensitive globule emits electrons in proportion to the amount of light falling upon it; the more light that falls on a given area, the more electrons are emitted from that area. This process is called "photoemission".

Since a loss of electrons means a more positive charge, photoemission sets up a variety of different charges over the surface of the mosaic in accordance with the distribution of the light it is receiving. So far no video signal has been produced because the globules are insulated from the signal plate.

Since the path from the mosaic to the signal plate is through a capacitor, the only way to get a signal across is to produce a sudden *change* of potential. In the Iconoscope type of tube, this change of potential is produced by the action of the electron beam from the gun. (The necessary orderly scanning action from left to right and top to bottom is provided by suitable currents through the deflecting yoke, as in the case of a magnetically-deflected picture tube.)

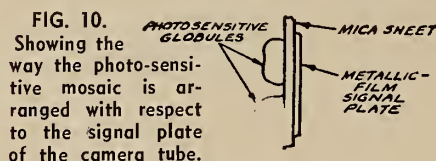
In order to understand the effects produced by this scanning beam, let us first consider three possible conditions on the surface of the mosaic *before* scanning.

It has been found that the ordinary Iconoscope mosaic in *total darkness* (black scene) assumes a potential of -1.5 volts relative to the collector ring. When strong light (white scene) falls on a portion of the mosaic, a considerable number of electrons are lost by photoemission and the potential is changed from, say, -1.5 volts to 0 volt. Illumination of medium intensity (gray scene) may cause the potential to change from -1.5 volts to -0.8 volt.

These potentials of the mosaic, then, may be approximately as follows for these portions of the mosaic: black area, -1.5 volts; gray area, -0.8 volt; white area, 0 volt.

How Screen Light is Varied

The electrons in the scanning beam travel so rapidly that when they strike a surface such as the Iconoscope mosaic they knock off a great many electrons,



more, in fact, than even bright light does. This kind of action is called "secondary emission".

So many electrons are thus lost by secondary emission that the portion of the mosaic directly under the action of the scanning beam is driven to a *positive* potential of +3 volts. Each portion of the mosaic is driven to +3 volts *during the instant the scanning beam acts upon it* and this +3 volt potential is reached *regardless of the light conditions prevailing*—a black area goes to +3 volts as well as a white or gray area.

Although the *peak* of potential reached by every area as the scanning beam passes over it is the same, the *change in potential* which this area undergoes at this time will depend on the illumination it has received. Thus the black area will change from -1.5 to +3 volts, a change of 4.5 volts; the gray area will change from -0.8 to +3 volts, a change

of 3.8 volts; the white area will change from 0 to 3 volts, a change of 3 volts.

It is this *sudden change of potential* which is induced on the signal plate that causes the video signal current to flow through the load resistor. The *difference between the changes* for black, gray, and white areas is what indicates the difference in the illumination over the mosaic surface as it is scanned, and this difference is proportional to the distribution of light over the mosaic.

The important things to notice here are: (1) that we get a video signal across the load resistor (Fig. 9) only when a *change of potential* is produced on the mosaic, and that this is accomplished by the scanning beam; and (2) that the resultant *video signal is proportional to the light coming from the scene being televised*, the signal being of *maximum* amplitude for *black* portions of the scene, *minimum* amplitude for *white* portions.

The collector ring (2nd anode) serves to accelerate the electrons in the scanning beam and also to collect some of the electrons emitted from the mosaic. In Fig. 9 you will notice that this element is grounded; it is, however, 500 to 1000 volts *positive* with respect to the cathode of the electron gun, because the gun is at a corresponding potential *negative* with respect to ground.

This will not be the last time that you will find Tv tubes with elements at very high negative potentials, and the possibility of such circuits existing must always be borne in mind as a safety measure.

New Orthicon Extremely Sensitive

Another tube more recently developed is the RCA Image Orthicon. This tube retains the essential features of the Iconoscope but it is much more sensitive and efficient. Its high degree of sensitivity permits the pickup of scenes in candle-light and varying degrees of darkness, makes possible "round-the-clock" Tv.

A simplified cross-section of the Image Orthicon is shown in Fig. 11. In operation, the scanning beam is projected from

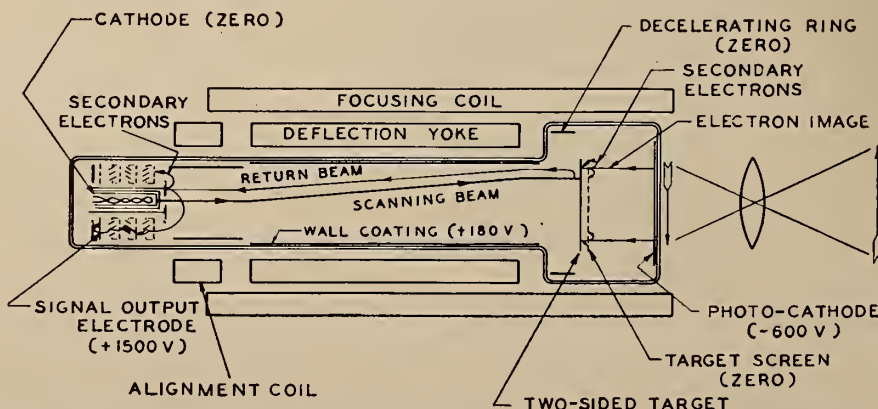


FIG. 11. Elements of the Image Orthicon tube, including the deflection yoke and the focusing coil.

Lower-Mag Fire Baffles Armed Services

THERE occurred recently at an Armed Service post (which shall be unidentified) a projection room fire the circumstances attendant upon which no less than the serious consequences thereof induce more than passing interest. The facts relative to the incident, as reported by the officer in charge, are as follows:

Midway through a showing of a feature-length picture the screen suddenly went blank, to the accompaniment of, stated the post commandant who was in the audience, an "explosive sound which seemed to issue from the projection room". Subsequent investigation, consisting chiefly of interrogation of the projectionist on duty at the time, revealed the following sequence of events:

A pile-up of film in the lower magazine became ignited. The projectionist testified that he pulled the arc and projector switches, yanked the blazing reel out of the lower magazine, and finally succeeded in quelling the blaze with the aid of a CO₂ extinguisher. Burns sustained by the projectionist was the least unfortunate consequence of the fire: he was overpowered and rendered seriously ill for many days as a result of inhaling the noxious fumes from the burning film.

Testify to Normal Conditions

The projectionist also testified that all normal operating precautions were observed: the no-smoking rule was adhered to; the automatic fire shutter was tested prior to showtime and found in working order; projector and magazine doors were closed and latched; the film was properly threaded, and all projector parts were in good working order as attested to by the uneventful projection of film prior to the fire.

The officer in charge, asking that IP review the incident, stated that his investigation failed to uncover any "satisfactory determination" of the cause of the fire, no less than to indicate any procedure for preventing a repetition, and had left him with an "altogether baffled" feeling. Could IP offer any constructive suggestions?

Now, such long-distance "experting" borders on the ridiculous as far as any

accurate appraisal of the reason "why" is concerned, because it must necessarily be pure speculation. Some possible reasons for such an occurrence may be advanced, however, if only to soothe the officer's ruffled feelings.

Smoking in the projection room is apparently ruled out—on the projectionist's say-so, that is. The post commandant may have mistaken some other sound for that of an "explosion" in the projection room, because the projectionist was able to approach and deal effectively with the burning reel of film.

Noteworthy is the projectionist's testimony that he "pulled out" the blazing reel. If this actually happened (a bit of a strain on one's credulity) the amount of film in the reel must have been very small and, accordingly, the accident must have happened shortly after the projector was switched on.

Fighting Film Fires Hazardous

It is entirely possible to extinguish a small film fire with CO₂, but competent workers in the art are agreed that such procedure is extremely hazardous. Exposure to the fumes produced by burning nitrate film may easily result fatally. Anybody who has read the various articles on the toxic effect of burning film which have appeared in IP (notably the contributions of Robert A. Mitchell) has undoubtedly engraved upon his mind the one course of action should a film fire occur: go away from it *fast!* In fact, the

That Long Lost Week-End

Variation on the lost week-end theme, as related by Al Malley in IA L. U. 150's "Sound Ripples":

"An IA-member-at-large (from Minneapolis) now working in our jurisdiction told us this one.

"While passing through a Northern California town he called at the Union office to say hello. He declined the offer of some work, and then the B. A. asked if he wouldn't help out 'just over the week-end'. Yes, replied the visitor, he would if still in town.

"He was, and he did. The 'week-end' lasted 18 months!"

as dynodes. These dynodes are coated with a material capable of high secondary emission. Referring to Fig. 11, when the electrons in the return beam strike the first of the dynodes, secondary electrons are emitted. These secondary electrons in turn strike other dynodes, greatly increasing the total number of electrons and hence the current carrying the picture information. This procedure is repeated for each element in the televised scene.

[To Be Continued]

laws of several states prohibit the placement of extinguishers of any type in projection rooms.

It is IP's opinion that the pile-up of film in the lower magazine, presumably resulting from faulty action of the takeup assembly, has not been satisfactorily explained. If the pile-up was discovered before the fire, why was the projector not shut down? If after the fire, how did the piled-up film escape burning?

If an unburned accumulation of film was found in the soundhead, as testified, the possibility of fire originating in the film gate of the projector mechanism is definitely ruled out.

Obvious Unit Eliminations

It seems that the soundhead itself may be freed of suspicion. In most soundheads it is impossible for the film, even in the event of a pile-up, to come in contact with hot exciters, rheostats, etc.

The possibility of fire being carried down into the lower magazine from the mechanism film gate is exceedingly remote in any case. Testimony states that the automatic fire shutter was inspected prior to the show and was found to be in satisfactory working order. The Simplex E-7 possesses a supplementary protective device over the upper film loop, thus minimizing the possibility of burn-outs at the aperture. It is very difficult to believe that this fire originated in the gate of the projector.

It is also declared that the magazine doors were closed. There is, however, strong reason to suspect that the lower magazine door was either unlatched or open. As a working hypothesis it may be assumed that (a) a pile-up forced the unlatched door open, or (b) the reel failed to turn and film ran onto the floor from the open magazine. It seems reasonably well established that the takeup failed to function properly.

Possible Causes of Incident

IP's opinion is that power surges had nothing to do with the faulty action of the takeup. Whatever their cause, power (voltage) surges do not affect the speed of a-c motors of the synchronous, repulsion-induction, or split-phase types. The slightest irregularities in the speed of the projectors would have been very apparent to the audience in the sound reproduction.

The failure of the takeup may be attributed to (a) incorrect adjustment of the friction clutch (b) the use of a bent or otherwise damaged reel (c) the use of a shipping reel having a 1 3/4" or 2" hub (d) failure to lock the reel to the takeup spindle or (e) a broken or worn key on the takeup spindle.

To return to the cause of the fire, IP is forced to assume that film somehow escaped from the lower magazine and came in contact with a spark, flame, or

the cathode (extreme left) toward the target at the right on which electrical charges have been built up for focusing an image of the scene on the photocathode. The scanning beam is given just enough velocity to reach the target.

If the electrons in the beam strike a positive charge, they are absorbed. If the target charge is negative, electrons in the beam are returned to the area near the cathode.

Incorporated within the tube near the cathode are reflecting electrodes known

body of sufficiently high temperature to raise the film to its flash point (300° F. or higher).

Suggested Preventive Measures

If no electrical apparatus capable of emitting "hot" sparks or of developing considerable heat was placed on the floor of the projection room, one can only surmise that a hot carbon stub had accidentally rolled under the lower magazine, or that someone, without the knowledge of the projectionist, had dropped a smoldering cigarette or cigar stub on the floor. The position of the cans in which hot carbon stubs are placed is worthy of investigation.

Very much can be done in the way of preventing fires such as this by:

1. Insisting on the very highest standards of film inspection in projection rooms and providing adequate time for the projectionists to make repairs to defective prints.

2. Frequently checking the adjustment of the projector takeup assemblies.

3. Supplying approved projection reels and *prohibiting the use of shipping reels on the projectors.*

4. Placing all carbon-stub receptacles as far away as possible from the projectors and film cabinets.

5. Closing off all floor-level registers or vents which open into the auditorium (if these are in the immediate vicinity of projectors, film cabinets, or rewind benches).



To the Editor of IP:

American readers of IP have undoubtedly encountered in material emanating from Great Britain the term "projected track method" as applied to sound reproduction, as contrasted with the "projected slit" method utilized by RCA, W. E. and other American makes of sound equipment.

The foremost sound equipment company over here, British Acoustic Films, Ltd., has always used a soundhead optical system which utilizes the "projected track" method, even in their latest Type 83 unit incorporated in the G-K 21 (Gaumont-Kalee), which describes the method as follows:

"The exciter lamp is mounted in a compartment on the extreme left of the soundhead. Immediately in front of the lamp is a large condenser which projects the light horizontally forward to a prism mounted partly within the scanning drum. This prism reverses the light path and directs it back through the sound track, through the objective lens and onto the window bearing the mechanical slit.

"The window is in a housing containing a prism which directs the received light vertically downwards onto the cathode of the p. e. cell. The optical magnification is 6 times, which means that an enlarged image, 6 times that of the actual sound track, is impressed on the window.

"With the film stationary, it is immediately possible to check whether the focus is approximately accurate; with the film running, it is immediately evident if either sprocket holes or the edge of the picture is being projected onto the slit. The window has fixed masks to accept the international standard width soundtrack of 0.084 inch.

"In the G-2 and G-3 soundheads the magnification ratio was seven times, but the scanning details are essentially as described in the foregoing. One of the British "big four," the B.T.H., uses the projected slit method which is standard in America.

ROBERT H. PULMAN
Chief Projection Engineer
Gaumont-British Picture Corp., Ltd.
London, England.

To the Editor of IP:

Relative to your invitation to comment on the new acetate film: an important element in projectionist psychology is the faith in the things he works with. When I finish working over a nitrate print prior to projection, I have a certain peace of mind because I know from experience that it has what it takes in terms of strength and durability and can take a beating and still hold a good splice.

This inherent physical strength is not present in the new acetate stock. Being in a circuit house, we invariably get good prints. But in a recent acetate print several splices had to be remade; and don't let anybody tell you that it is just as easy to make a good splice on acetate as on nitrate film.

I began, gingerly, to splice this acetate print. Then developed all those delays which the eminent Dr. Fordyce¹ mentioned so gently, even sweetly: extra fresh special cement, extra fine scraper, extra care and, important to me, extra time before and during the show. If after being removed from the splicer and having had all this extra attention lavished upon it the splice comes apart rather easily, the projectionist is cer-

¹"New Acetate Film for Release Prints," by Dr. Charles R. Fordyce; IP for June, 1948, p. 5.

An Appreciation

By STANLEY T. PERRY

Chief Projectionist, Loew's Empire Theatre
Leicester Square, London, England

IT WAS WITH a heavy heart that I read in IP of the passing of Thad Barrows, of Boston, Mass. I mourn his going not only as a person but equally for those fine qualities which made the man.

My thoughts go back to a summer evening several years before the War. I was busy in the projection room when the phone rang: "A Mr. Barrows of Boston to see you in the vestibule." Excitedly I rushed downstairs—I knew all about Mr. Barrows through personal and printed contacts with America—and there I met T.C.B.

Thad smiled (such an infectious smile), we shook hands, and he suggested "Let's have a drink somewhere and talk a bit." We did just that, only the "bit" extended over three hours during which we talked shop, exchanged views and in general had a very warm personal session. Instinctively I felt that I had known Thad for ever so long, that I would always know him well. Even in this comparatively brief time I learned to like and respect Thad quite beyond the fact that as brother craftsmen we had mutual interests.

A Decided Asset to the Projection Craft

We parted company that evening—most reluctantly on my part—with Thad saying he would try to see me again before sailing for home. He never did; but through each succeeding year we kept in touch with each other and I followed his activities in IP.

I realize that thousands of American projectionists never met Thad, and in this respect I consider myself ever so much more fortunate than they. Our craft has progressed through the efforts of men like Thad who are content to work for the betterment of others without thought of any personal reward. We can ill afford to lose such men.

Farewell, Thad Barrows. You did a great job, set a fine example by never sparing yourself in the service of others. Your reward has been the greatest possible—the friendship and appreciation of those who knew you. We shan't forget you.

tainly not going to have any confidence that his show will stand up on its runs through the projector.

For my part, manufacturers of film stock would favor the industry as a whole by seeking to improve the present nitrate film rather than in pushing an acetate stock which, I think, has inherent weaknesses which make it highly undesirable.

MICHAEL SMOLLIN
Easthampton, N. Y.

[NOTE: The only way to accurately evaluate the worth of the new acetate stock is by means of opinions such as the foregoing from projectionists who handle the film in the field. IP again urges that projectionists handling acetate film advise as to their experience with it.—Ed.]

How the "Guinea Pig Arc" Builds Bigger Box Office!



● We put "National" projector carbons in the water-cooled jaws of this special mechanism . . . sock them with king-size jolts of electricity . . . try them at different angles . . . experiment with dozens of sizes and types — and come up with projector carbons that are tailor made for your theatre. The light from "National" carbons is therefore brighter. It is steadier. It is nearly perfect for bringing out the rich tones of color movies.

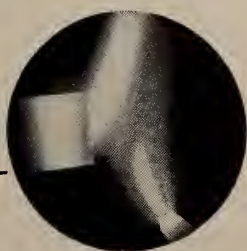
This experimental arc mechanism is only one detail in National Carbon Company's extensive laboratory effort to develop better projector carbons. You, the exhibitor, reap the benefits in better screen visibility, satisfied patrons, and bigger box office!

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WHEN YOU BUY PROJECTOR CARBONS, BUY "NATIONAL"!

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

THE receipt recently of several anguished letters from projectionists at widely scattered points who plead for relief from consistently bad prints occasioned a bit of snooping on our part in an effort to get the low-down on this situation. The results of this detecting will, we are sure, interest all IP readers; but first we offer excerpts from a typical letter of complaint:

"I work in an A house and the film is in fairly good shape—most of the time. But, brother, you should see the stuff the B and later-run houses get! Somebody should be put in the pokey for sending out such stuff; it's just plain murder.

"Who is to blame for this situation? We cuss the inspectors plenty; yet it's strange that we can't get close enough to those people, who are our own IA brother- and sister-members, to improve matters. Why not? Working conditions in *both* projection rooms and exchanges are strongly affected by bum prints and are also a vital part of organizational activity—particularly when, as in our case, it's all in the family."

(NOTE: He has something there.—H. S.)

"Why do those exchange cuties try to roast us alive? Surely not just for the hell of it. They must have *some* explanation. Please get the dope from some *responsible* person in the exchange field. Let's have the truth—whether it be a shortage of prints, or over-worked inspectors, or just plain dopeyness. Thousands of guys like me (and I mean

thousands) would like to know the answer to this one."

Thus the projectionist beef. This department proceeded to solicit the opinions of "responsible" exchange-worker leaders. From an official of an IA Local in a representative exchange center came the following:

"The answers to your questions are pretty obvious. First and foremost, none of the exchanges have enough help, as nobody wants the jobs for the salaries offered—if one can dignify the pay by the term "salary." And I don't blame them. Film companies consider the exchange and shipping departments as little better than sweatshops. Who does the work and how it is done is unimportant just as long as it *gets out of the exchange and onto the delivery truck*.

"Second, the constant turnover in help means a continuing shortage of personnel in terms of the over-all work load. Result: the rest of the girl inspectors bear the added burden of work—on a *rush* basis. Most projectionists won't credit the statement that each girl has to wade through and get out *from 80 to 100 reels of film daily!*

"Consider a typical Saturday night at the exchanges in this area. Two girls are asked to get out 20 or 25 *features* (not *reels*, mind you) *plus shorts*, within three or four hours, because the drivers are yelping to get going and deliver the film for the theatres' Sunday matinees.

"I can't really blame projectionists for

yapping; but I ask how in the world our girls can do their jobs under such conditions? It just can't be done. The answer? Need I tell you?"

The foregoing, while informative, is rather a negative slant on the problem since it offers no constructive suggestion for improvement. This defect is overcome in some measure by the suggestion contained in the appended letter from a very active person in the exchange-worker field:

"Many prints return to us from theatres in perfectly horrible condition, but it's difficult to say whether the mutilation process begins in a given theatre or has its inception in faulty exchange work.

"We're still terribly handicapped in the exchanges, for several reasons: shortage of inspectors, due partly to absenteeism and partly to lack of exchange working space; the shortage of prints causing close booking which in turn necessitates film being merely checked or gone over rapidly in order to meet schedules of truck lines and trains; poor quality reels and cases and bum cement, which add up to no joke for the inspector who has eight hours daily of stinky splices to take out and remake.

"Every inspector has been briefed on the terrific fire hazard occasioned by faulty prints; if there is any chiseling on the exchange end, we certainly would like to know about it.

"My suggestion to projectionists is as follows: have your business agent contact the B-Local in your territory and ask for cooperation. Let him be specific in his complaints: print name, theatre, and playdate.

"Failing to obtain such cooperation, the business agent should notify the managers of theatres that it will be necessary for projectionists to report for work one hour early at *time-and-one-half* to inspect every reel of film and thus enable the projection of a decent show. Further, the manager should be advised to deduct this overtime pay from the film rental. The fuss stirred up by this procedure would, I am sure, pave the way for a mutually satisfactory solution."

Intriguing suggestion, this, and might possibly work. In fact, this procedure is related to the suggestion often made by IP that duplicate inspection forms be used in the projection room for noting the condition of every reel of film, to-

HAVE YOUR WAGES RISEN 69.1% (or even 25%) OVER THE 1935-39 SCALE?

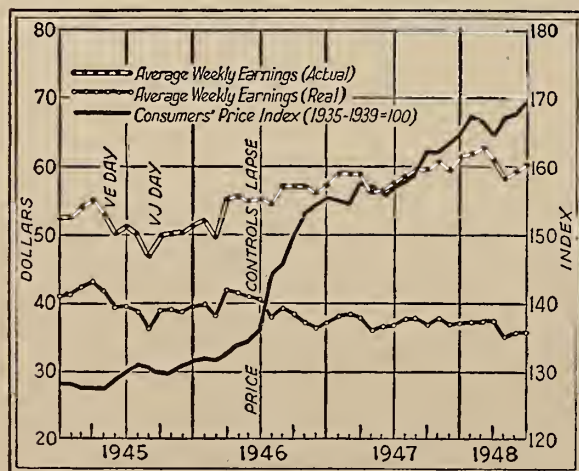


Chart prepared by N. Y. State Labor Dept. based on survey of 900,000 manufacturing employees in N. Y. City. A persistent decline in "real" wages (i.e., what money will buy at current prices) is shown, while living costs have soared 69.1% above 1935-39 base. Note almost vertical price rise when price controls were lifted in 1946. Trends shown are believed generally true of employed workers as a whole. Ask your Congressman if this situation reflects the "American way" and the "more abundant life" about which he will again prattle in the election this Fall.

gether with a disclaimer of responsibility by the projectionists for any untoward happening during the show.

We doubt, however, that, apart from normal wear on overworked prints, the film mutilation process begins in the projection room. Pappy Luther's investigation of conditions in the Dallas exchange area some months ago proved conclusively that the bulk of the damage was done in outlying houses staffed by projectionists (?) whose average age, 16 years, matched their weekly salaries.

Strange it is, though, that our last commentator should gloss over any mention of better working conditions, the elements of which are more workers, better pay, and ample working quarters, not to mention improved reels and shipping cases. Let's not forget the most important point in the first letter quoted herein: "It just can't be done"—that is, under present conditions.

It's very plain that the exchange people have a tough time of it under the conditions outlined herein; but it must not be forgotten that the projectionist has a vital stake in the matter, too. It's his skin. Equally plain, on the say-so of the exchange people themselves, is the cure for this situation.

- Just imagine yourself trying to escape from a roaring projection room fire and finding the sole exit door blocked and being forced to crawl out to the balcony through a porthole 3 by 5 feet. That's what happened recently to Frank Hill, projectionist at the Apollo Theatre in Boston. Removed to the hospital, Hill, horribly burned and saturated internally with noxious fumes, lingered briefly and then died.

The fact that Hill was not an IA man and thus not the beneficiary of a Local's protective insistence upon decent room standards does not alter the fact that here is still another man who paid the price—and *what* a price—for exhibitor greed.

- The ninth annual convention of the Motion Picture Protective Association (Big 5) was held at the Henry Grady Hotel, Atlanta, July 15 last. Much of the discussion centered around the controversial subject of television and its probable effect upon motion picture theatres. General Secretary-Treasurer W. P.



Jake Pries

Raoul addressed the gathering, and gave a brief resume of the progress of the IA during the past seven years. His talk was warmly received and the members gave him a rising vote of thanks.

Delegates present were Jake Pries and

Front Pages Hail New Era in Theatrical Labor Relations as Chicago L. 110 Blazes Trail in Welfare Benefits 5-Year Pact for \$2 Million

CHICAGO
Herald and American
VOL. XLIX No. 27 THURSDAY, August 9, 1946
8 STAR SPORTS



Gene Atkinson

BULLETIN

MOVIE OPERATORS SIGN CONTRACT
THE CHICAGO MOVING PICTURE OPERATORS UNION, LOCAL 110 (AFL) TODAY SIGNED A FIVE-YEAR CONTRACT WITH ALL CHICAGO AREA MOTION PICTURE HOUSES WHICH PROVIDES FOR A 10 PER CENT WEEKLY INCREASE IN WAGES.
EUGENE J. ATKINSON, BUSINESS MANAGER OF THE LOCAL, SAID THE INCREASE WILL NOT GO INTO THE PAY ENVELOPES, BUT INTO A FUND WHICH WILL PROVIDE DISABILITY BENEFITS, RETIREMENT PENSIONS OF NOT LESS THAN \$100 A MONTH FOR LIFE, A VACATION FUND WITH TWO WEEKS PAY FOR EACH MEMBER AND INCREASED SICK AND DEATH BENEFITS.
ATKINSON ADDED THAT THE NEW CONTRACT ESTABLISHES CORDIAL RELATIONS BETWEEN THE UNION AND ALL FILM EXHIBITORS IN CHICAGO AND VICINITY.
THE NEGOTIATIONS WERE CONDUCTED BY ATKINSON, ATTORNEY CARMELL AND CLARENCE JALAS, SECRETARY-TREASURER, REPRESENTING THE UNION AND BY EDDIE SILVERMAN AND MORRIS LEONARD FOR THE THEATER OWNERS.

CONSUMMATION of a precedent-shattering agreement in the history of theatrical employer-labor relations in which employers pay directly into a fund to be used strictly for welfare benefits for 700 union workers was announced jointly August 5 by Gene Atkinson, business manager of Chicago Local 110, and representatives of 370 motion picture theatres in the Mid-West metropolis. The extreme importance of the pact was testified to by the practically unanimous front-page featuring of the story by all Chicago newspapers, a sample of which treatment is reproduced here.

The pact provides for the payment by Chicago exhibitors, effective Sept. 1 next and extending over a period of five years, of a flat 10% wage increase to all Local 110 members. The wage boost will not go into the workers' pay envelopes but will be diverted into a fund to provide widespread benefits for Local 110 members, including disability and retirement pensions, increased sick and death benefits, and extended vacation time.

It is estimated that the fund will provide about \$400,000 annually for such benefits, or \$2 million over the five-year span of the agreement. In addition to sick and death benefits, an immediate result of the agreement will be to clear the way for the retirement of some of the older members of Local 110, which in turn will permit the initiation of an equal number of new members, there now being more than 200 such applications on file. Local 110's membership books have been closed since 1943.

Tentative plans call for the payment of at least \$100 monthly to each retiring member, who will also continue to have the protection of a death benefit of more than \$2000. Death and disability payments heretofore have been realized by special monthly assessment of members.

Not only is this Local 110 pact unique in the theatrical labor field but it has few counterparts in any labor organization, the most notable example being the welfare agreement negotiated by the United Mine Workers. Informed observers readily admit that the trail-blazing action of Local 110 will likely be the forerunner of similar agreements now that the ice has been broken.

In addition to Atkinson, the negotiators were, for Local 110, James Gorman, president; Clarence Jalas, secretary-treasurer. and Daniel Carmell, attorney; for the exhibitors, Jack Kirsch, Eddie Silverman and Morris Leonard. Incident to the announcement of the pact was the release of figures showing that Local 110 members average 30 years of service, with a small group having spent 45 years in the craft. The fund will be administered by a board of six, three each from the exhibitor organization and Local 110.

Bill Snider, Atlanta Local 225; F. E. Walker and R. A. Root, Sr., Birmingham Local 236; A. C. Kamin and J. B. Lowery, Chattanooga Local 259; John McLain and C. C. Champe, Jr., Knoxville Local 405; W. J. Brown and A. E. Brown, Nashville Local 626. Among the invited guests were W. P. Raoul, IA Representative A. S. Johnstone, New Orleans Local 293; Special IA Representatives J. N. Spearing, Jacksonville Local 511, and M. K. Baird, Knoxville Local 405.

Also present were Thomas Wall, Birmingham Local 236; E. B. Kinard, Atlanta Local 225; O. A. Ayers, Chattanooga Local 259, and W. R. Hundley, Richmond Local 370.

Elected to office by acclamation for the ensuing year were Jake Pries, president; J. B. Lowery, vice-president, and R. A. Root, Sr., secretary-treasurer.

- Exhibitor organizations please note: American Type Founders, Inc. *volun-*

(Continued on page 23)

Projector Progress in GREAT BRITAIN

By H. HILL

American projectionists have heard much about the 'new look,' mechanically and visually, of post-war British projectors, some of which are now used in Canada. A noted British technician here gives his impressions of these new units, providing an interesting comparison with American projector design.

FREQUENT perusal of IP makes it fairly obvious that while some American projectors have been modified in design during the post-war period, the trend towards ultra-modern appearance has not developed in America to the same extent that it has here in Great Britain. Over here, streamlining has been carried out to a high degree; in some cases the design appears to be years ahead of its time.

The most original and compact of our post-war projectors, the SUPA (single unit projector assembly) is certainly very unusual, judged on any basis. The streamlined casing is a delight to the eye, easy to keep clean. Both the mechanism and soundhead are of the customary open British type, and two things which impress the keen observer are the ingenious film trap and the massive optical system. Apart from this there is little really new about the operational side.

The film-trap door is curved (reminiscent of the Simplex Grandeur of 1931) and possesses some good features: pivoted in front of the intermittent sprocket, it swings open from the top for threading and embodies a clever principle in connection with the door pads, which are carried in inclined slots in such a way that the pressure is somewhat reduced during the pull down, and as the film decelerates, the tension is re-applied.

SUPA a Massive, Well Made Job

Designed to minimize distortion due to uneven brightness of the scanning slit, the Taylor and Hobson soundhead optical unit employs the projected-track method. Overall, the SUPA is a very massive job and extremely well made.

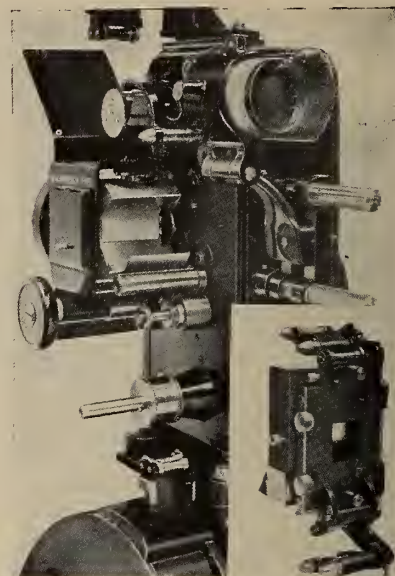
Employing reel spindles which are really sensible—they are $1\frac{1}{2}$ " in diameter—and double-walled magazines, the SUPA also possess an efficient fire-prevention device: both magazines are sealed against fire entry by the cutting of the film at the exit of the upper magazine and at the entry to the lower magazine by the operation of a fusible celluloid

link suspended above the film trap.

The gear side of this projector is, to say the least, unusual, and in some ways resembles the American DeVry, although it employs a roller chain as against the inverted-tooth type of the DeVry. The machining is of a high order and the projector itself runs very smoothly. Noteworthy is that all the bearings are grease-packed, the only section requiring the use of oil being the intermittent casing.

While the question of accessibility and the use of roller chains might be criticized by projectionists and design engineers, there is little doubt that the machine will run for many years with a minimum of attention.

The arc lamp is well made and is reasonably accessible for operation and cleaning. It employs a novel principle in connection with the automatic feed:

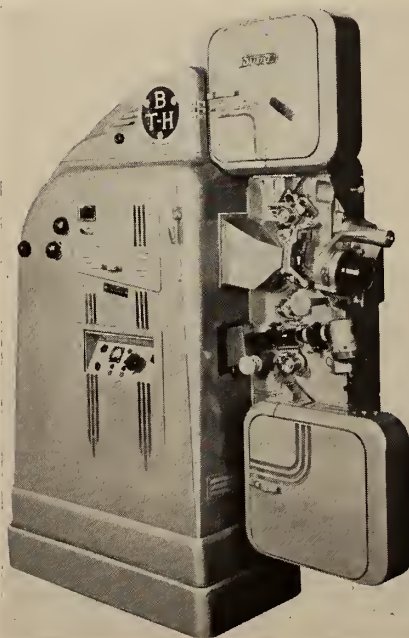


The Walturdaw Five, showing lens swung aside and, at lower right, the water-cooled gate removed. Note barrel-type shutter.

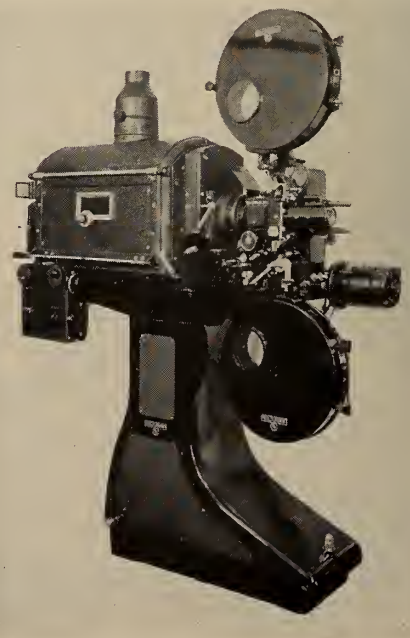
in conjunction with the usual electric driving motor a thermostat is used for maintaining the correct position of the positive carbon, while the carbons are fed in the orthodox way by means of variation in arc volts. Using an aperture of F:1.85, the lamp is capable of good results when matched with the correct lens.

Centralized Control, Fuse Grouping

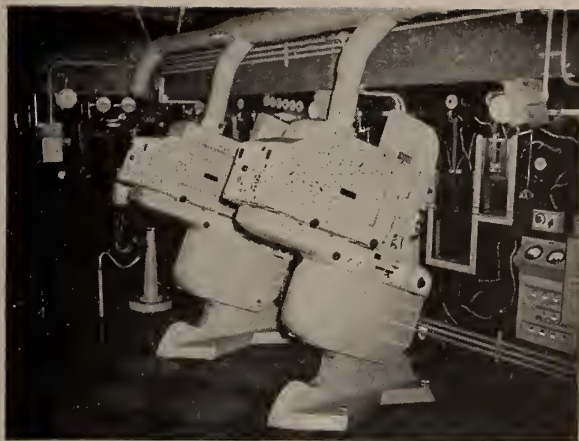
Centralized control is a feature which is extolled by some projectionists and condemned by others, for it is easy to press the wrong button or switch when all controls are grouped together. Never-



Over-all view of the streamlined B-T-H SUPA which combines in one enclosure all visual and sound projection units. Note control panel at side, regarded by some projectionists as inviting errors in operation.



Reminiscent of the Ernemann (German) projector is the Walturdaw Five unit of typical Continental open-type design, with water-cooled film trap and 8-frame upper and lower sprockets.



GK-21 projectors installed in ultra-modern projection room of the Gaumont, Haymarket Theatre, ace first-run house in London's fashionable West End. Projection chief Bob Pulman has a score of such installations which, he says, are right up there in every detail with anything he saw during his recent American tour.

theless, the SUPA has a really good central control panel and would be difficult to improve upon.

Mounted on sliding trays, the amplifier is reasonably accessible for service and is well made. All components appear to be of the best quality and they are neatly wired and positioned.

The grouping of fuses on the rear panel, together with the centralized control panel, entails quite a lot of intricate wiring, thus it is possible that some considerable time after installation problems may arise in connection with dust, fluff and arc bloom which are not too noticeable in orthodox installation work.

Generally speaking, the SUPA is extremely well made and is largely original in design. Its performance is good and, in terms of screen results, it compares favorably with other good projectors.

The Gaumont-Kalee 21

If the addition of streamlined casings, ultra-modern magazines and a super, polished finish can be considered aids to better projection, then the GK 21 must be about the most impressive job in existence. Superbly designed and beautifully finished, this projector tops the field in conception and in modernistic execution.

This well-balanced equipment looks good to the eye and the excellence of the components—switches, controls, *etc.*—leaves little to be desired. Although this is an enclosed projector, its appearance is not typically American at all, for the cutaway hinged side of the door—to

(Continued on page 27)

Forest Electronic Lamp Now Ready for Distribution

After almost a year of intensive field tests under actual projection room operating conditions, plus various refinements effected in manufacture, the Forest Electronic Arc Lamp is now available for general distribution.

The Forest lamp features a radical departure from conventional arc control means in that each carbon has its own timer, with its own control knob, which is actuated by a small Thyatron tube with fixed resistors and condensers connected directly into a simple circuit. Both timers are identical and interchangeable, being connected in the circuit through a plug which makes all connections and can be removed by merely separating the connection and then lift-

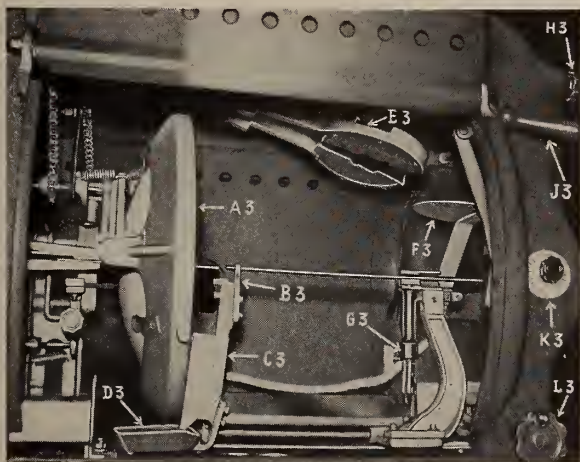
ing them out of their respective wells.

The positive and the negative carbon feed mechanisms are two separate and wholly distinct units, and each may be easily removed from the lamp. Mechanically, these feeds are very simple, a solenoid-operated pawl actuating a ratchet worm secured to the driving worm. There are no clutches, reducing gears or linkages.

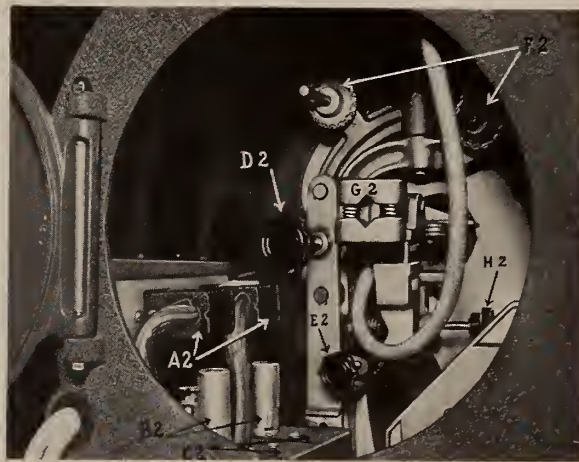
Change of feeding speed of each carbon is controlled separately by simply turning a knob which controls the speed of the carbon feed by changing the number of electrical impulses fed to the solenoid through its electric timer. Feeding speed control is likened in terms of accuracy to that in an electric clock.

The 14-inch B. & L. reflector is mounted to the lamp base instead of on a swinging door. Reflector adjustment in both the horizontal and vertical planes is made at the outside front of the lamp, thus the screen is easily visible while adjustment is made. An additional adjustment is provided for moving the reflector forward or backward, making it unnecessary to shift the lamp on its pedestal.

The wide operating range of currents afforded by the Forest lamp enables its use under all projection conditions, from short-throw, small-picture theatres to the largest drive-ins which project images up to 50 feet. The lamp is designed to burn any size carbon at any desired amperage. The arc imager may be placed at either side of the lamp at will, while a unique warning light provides a constant check on the unused portion of a carbon trim.



INTERIOR
VIEWS OF
FOREST
ELECTRONIC
CARBON ARC
LAMP
SHOWING
MAJOR
CONTROL
UNITS



Back door view: A-2, positive and negative timer receptacles, making all timer connections; B-2, shields over timer tubes; C-2, both timers; D-2, reflector adjustment horizontally.

E-2, vertical negative carbon adjustment; F-2, horizontal-vertical reflector adjustment from front of lamp; G-2, rear of negative carbon holder, showing spring tension carbon clamp; H-2, horizontal negative carbon adjustment.

Operating side: A-3, 14-inch reflector; B-3, positive carbon guide; C-3, drip chute; D-3, drip cup; E-3, flame shield raised; F-3, front dowser.

G-3, spring tension carbon clamp; H-3, reflector adjuster; J-3, dowser handle; K-3, positive carbon speed control; L-3, positive manual control. Electronic control means employed in this lamp eliminates many mechanical parts.

AnSCO Color Film in Production, Projection

Another in the Series of Articles on Leading Color Film Processes

THE increasing use of AnSCO Color film has been attracting more and more interest on the part of projectionists, theater operators, and audiences in this new color process. The beautiful, lifelike color rendition and the excellent screen sharpness, particularly evident in scenes with small background details, have occasioned widespread comment throughout the industry.

An AnSCO Color short subject, "Climbing the Matterhorn," released through Monogram last year, won an Academy "Oscar". A feature picture, "Sixteen Fathoms Deep," a story of the sponge fishing industry shot at Tarpon Springs, Florida, is currently in release through Monogram. Either of these films will give projectionists a good idea of the quality of AnSCO Color film.

Genesis of Color Photography

The principles underlying color photography are widely known, but it seems advisable to consider briefly the principle on which AnSCO Color film records scenes in full color. Actually, the explanation is quite simple. It depends on the basic fact that by mixing green light, blue light, and red light in the correct proportions the human eye can be given the impression of almost any color. Just why this is true is not considered here, but if you accept it as a fact (and it can be proved) the explanation of three-color photography is easily understood.

All that is needed to produce a color picture is the combination of the primary colors of light, blue light, green light and red light, in the proper proportions for each part of the subject. White light is composed of all colors and can, in fact, be broken down into its component colors, for example by a prism.

How AnSCO Color Film Works

Objects in Nature appear colored because they reflect only part of the white light that strikes them. If a red rose be illuminated by white light—which contains blue, green and red—the rose absorbs and does not reflect the blue light or the green light. As a result, the reflected red light is all that the eye sees. Actually, some blue and some green light may also be reflected, though the major portion is red. The small amounts of green and blue simply change the *brilliance*, and to some extent the *hue*, of the red in the rose.

AnSCO Color film works by exactly the same process of selectively absorbing light. Three emulsion layers coated on the film make separate records of the original subject: one of the amount of blue light; one of the green light; and one of the red light. When the film is processed, dyes are produced in these three layers—dyes of colors complementary to blue, green and red.

Now, these dyes are *not* the original blue, green and red primaries mentioned above. They are, instead, dyes which block out one, and only one, of the three primaries. For example, in the blue-sensitive emulsion layer the areas of the emulsion not affected by blue light at the time of the original exposure in the camera are dyed yellow, a color that allows both red and green light to pass freely while absorbing or blocking out blue light.

The center emulsion layer which records green contains a magenta dye in the portions unaffected by the camera exposure that absorbs or blocks out the

green light but allows both the blue and the red light to pass freely through it. In a similar manner the red-sensitive layer is dyed cyan, which transmits green and blue light but absorbs red light.

The processed film thus yields a positive color picture composed of three separate dye images, each of which is the complementary hue of its exposing light. By various combinations of the three dye colors the film recreates the colors of the original subjects. Absence of the dyes in the picture area represent white; together the three dyes form black; magenta and yellow form red; cyan and yellow form green, and so on in an almost infinite number of different hues, shades, and tints.

AnSCO Exposure, Processing Action

These three dyes can be thought of as three curtains, one for each primary color. Since the amount of dye as well as the presence or absence of it can be varied in a photographic color medium like AnSCO Color Film, the particular depth and shade of color produced can be controlled by subtracting from the viewing light more or less of the primary colors.

The net effect of exposing and processing AnSCO Color film is that light striking the film when it is exposed in the camera *lifts the dye curtains by the correct amount*. Unexposed AnSCO Color

(Continued on page 22)

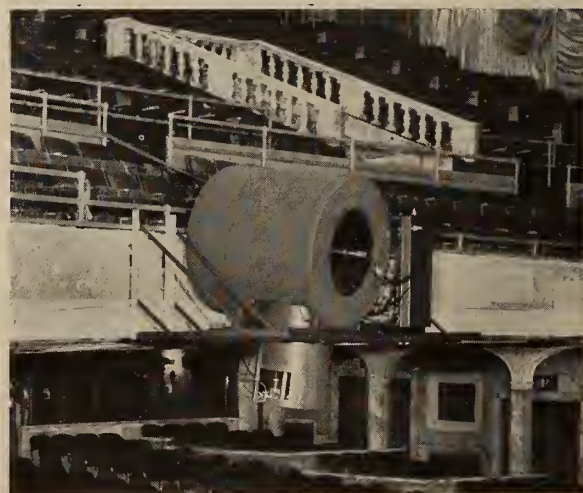
20th Fox-RCA Premier Instantaneous Tv Theatre Showing

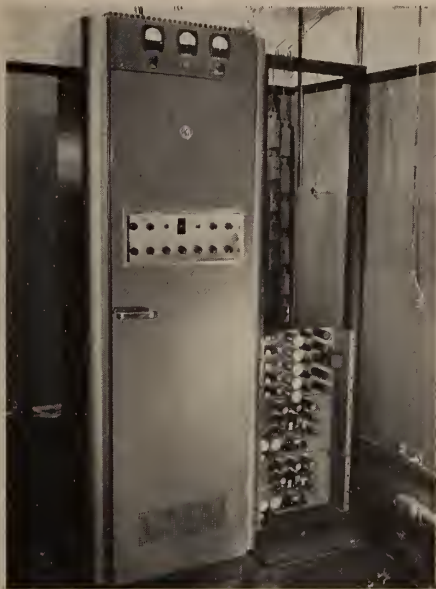
ON the night of June 25th last an audience of 2400 people in the Fox Philadelphia (Penna.) theatre stood up in their seats and cheered Joe Louis who at that instant was 89 miles away administering the *coup de grace* to the challenger for his world heavyweight crown. Each man and woman in that theatre was, by virtue of a modern miracle of science, at ringside in Yankee Stadium in New York City.

Actually this was no "miracle" at all.

It was one of the natural steps to be taken in the course of development of large-screen theatre Tv. While this demonstration was the result of much hard work, the combination of inventive and engineering skills, and determination and vision on the part of many men, it was not the end result. It did help to point the way, to answer some of the questions, to act as a guide to some of the problems that will be solved before theatre Tv. joins the ranks of everyday phenomena.

Optical barrel and adjacent equipment of RCA-20th Fox theatre television equipment located on hangar immediately in front of balcony loge. Cover plate of lower tube is removed, exposing part of high-voltage current supply unit. Installed in the projection room was an equipment rack and control panel as part of receiving terminal unit.





Equipment rack and control panel of RCA-20th Fox theatre Tv system as located in projection room of Fox Theatre, Philadelphia. Rack equipment at right is part of terminal unit to bring the picture into the theatre.

Such a long range goal is the object of a joint RCA-Warner Bros.-20th Century-Fox developmental program.

Scores Number of 'Firsts'

Nevertheless, the Fox demonstration does have a substantial number of firsts to its credit. It was the first installation of instantaneous Tv on a full-size screen in a regular motion picture theatre in this country; it was the first demonstration of such equipment before a regular, paying, theatre audience; and it was the first time in large-screen theatre Tv history where the scheduled event took place nearly 100 miles away from the audience.

The word "instantaneous" has been used here to identify the method of producing a Tv picture on the face of a cathode ray tube and simultaneously projecting that picture by means of an optical system, to the viewing screen. To obtain sufficient picture brilliance for a 400-sq. ft. screen not only must considerable light be generated in the television tube, but the optical system and screen must make efficient use of the light that is available.

For these reasons the RCA instantaneous projector employs a special cathode ray tube designed for an 80,000-volt accelerating potential and the efficient Schmidt optical system. Moreover, a special type of directional screen which is now being developed by 20th Century-Fox was installed for the demonstration.

An alternate method of theatre Tv which is being tested by 20th Century-Fox and has been publicly demonstrated by Paramount, consists of recording the Tv picture and sound on motion picture film, rapidly processing and drying this film and projecting the picture on the

theatre screen with standard motion picture projection equipment. New techniques of rapid processing of film have cut the elapsed time between the act of protographing and projecting the television picture to something of the order of one minute.

Thus while some might classify the demonstration given at the Fox theatre as a stunt, it was actually an attempt not only to show that instantaneous Tv projection was possible, but also to determine some of the practical problems of installation in a regular theatre, to determine what changes in equipment design would facilitate installation and operation, and, equally important, to compare the reaction of the theatre audience to the reaction of the audience present at the actual event. From all standpoints, it can be said that the demonstration was a success.

The equipment has now been removed from the theatre to the 20th-Fox laboratory in New York for qualitative tests, criticism and improvement.

Details of Installation

The statistics of the installation can be recited simply. The projector was divided into three parts: the optical barrel which houses the Schmidt optical system (12-inch cathode ray tube, 42-inch di-

ameter spherical mirror, and a 26-inch diameter correcting lens) and a smaller tube for the 80-kilovolt supply; a small equipment rack adjacent to the optical barrel containing those circuits which cannot as yet be placed at a distance from the cathode ray tube; and one standard-size equipment rack which contains the remaining circuits, power supplies and operator's control panel.

The optical barrel and small equipment rack were placed on a hangar supported from the structural ironwork at the front edge of the balcony loge. The throw from this point to the screen was just over the nominal 40-foot distance required by the present equipment.

In spite of the fact that the barrel is 51 inches in diameter, only 15 loge seats immediately behind this housing were blocked from the screen.

The control panel and remaining cir-

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cuits were placed adjacent to a port in the theatre projection room 121 feet from the screen. A 100-foot cable run joined this rack to the equipment on the hangar. The projection room is not only a suitable spot to station the control man but is also a convenient spot for obtaining the 20 amperes of 115-volt, 60-cycle power required by the projector, as well as locating the terminal equipment, both audio and video, required for bringing the program into the theatre, and for connecting program sound into the normal house amplifying system.

Of course, bringing the program into

the theatre is an independent but very interesting problem. Technically there are three methods that might be used: (1) pickup of a signal from a Tv broadcast station, (2) use of a selected and equalized phone line or coaxial cable, or (3) reception of a microwave signal over a radio relay system. Each of these methods has its own peculiar problems, both from the point of view of the F.C.C. and the organizations responsible for the program and the program pickup.

For the Philadelphia demonstration 20th-Fox made use of the NBC pickup and network facilities to bring the pro-

gram from the Yankee Stadium in New York to Philadelphia. Transmission from the NBC relay terminal at the WPTZ transmitter to the Fox Theatre building, a light-of-sight distance of nine miles, was made by one link of microwave relay equipment installed and operated by RCA personnel on an experimental license—with special authorization by the F.C.C. Program sound was furnished by an A.T.&T. line installation terminated in the projection room.

Is theatre Tv here? No, there are still problems to be solved. Theatre projection of a Tv picture is possible and has been demonstrated by two different methods in Philadelphia and New York, but technical, legal and programming problems remain.

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ANSCO COLOR FILM

(Continued from page 20)

film is entirely black after processing. Film exposed to white light contains no dye images and is completely transparent.

For example, if a blue object appears in your picture, blue light from this object falls upon the topmost layer of the film, the layer which will contain a yellow dye image after processing. Now, because the yellow dye will act as a curtain for blue light, the film is so made that wherever blue light strikes it the yellow dye is not formed when the film is processed. Therefore, blue is not eliminated from the light by which you view the transparency, and that particular area looks blue.

Of course, if the film is struck by red and green light as well as by blue, the other two curtains (magenta and cyan) will also be opened and the object will appear white. For this to happen, the object photographed must have been white: in other words, it must have reflected not only blue light but also red and green, which together make white. In an analogous way, other colors are faithfully recorded and reproduce the original scene in full natural color.

Simplicity of the Process

In addition to the beautiful color recording characteristics of Ansco Color films, these materials also have the great advantage of being extremely simple to use in motion picture productions. The original exposures can be made in the standard type of black-and-white cameras that have been in general use in the industry for years. No special laboratory equipment is necessary for processing the film, as slight modification of standard b-and-w processing machinery makes this equipment completely suitable for processing Ansco film.

The camera film, as well as the film used for making release prints, can all be processed in the same solutions with only slight changes in the treatment times. Most motion picture printing

equipment which is suitable for use with present-day b-and-w positive stocks can be readily adapted for printing Ansco Color Film.

As far as handling by the projectionist is concerned, a print on Ansco Color Film Type 732 (release print film) is no different from a conventional b-and-w print on nitrate base. The emulsion is on only one side of the base and faces the lamphouse as on a b-and-w print. An Ansco Color print can be spliced or cleaned in exactly the same manner as b-and-w print on nitrate base, and its light-transmission characteristics are such that no special adjustments of the lamp or optics are required. Ansco Color release prints may be spliced with the same cements and procedure used for nitrate b-and-w films.

To summarize, professional motion picture photography with Ansco Color film enables the production of full-color release prints, including commonly used special effects, with only very minor changes in the equipment currently being used for the production of b-and-w. As the use of this material can be readily mastered by those familiar with b-and-w techniques, a growing increase in the use of Ansco Color film motion picture production may be expected.

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IN THE SPOTLIGHT

(Continued from page 17)

tarily granted a 7½% wage increase to its 1650 employees, members of the International Association of Machinists. This unsolicited pay boost was given by the company in recognition of increased living costs and was accepted by the union as a supplement to the existing contract expiring in the Spring of 1949. In commenting on this rise in pay, the union pointed out that the present contract with American Type Founders has no provision for the reopening of wage negotiations, a fact which makes the company's voluntary wage increase so unusual in these days of bickerings between labor and management.

• Our very good friend, Bert Sanford, Altec theatre equipment sales chief, had a bang-up celebration last month in honor of his grandchild's first birthday. Bert is a member of our favorite club, the 25-30, and is very popular in the industry.

• Local 414, Wichita, Kansas, is rapidly forging ahead as one of the more progressive of the smaller IA Locals. Recent contracts signed with the Fox Theatres in Wichita provide for a 15% wage increase, time-and-a-half for overtime, and two weeks vacation with pay.

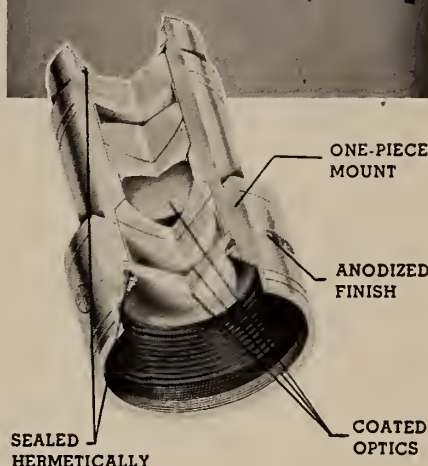
• C. C. Champe, Local 405, Knoxville, Tenn., was elected vice-president of the Tennessee Federation of Labor.

• The offices of IP last month took on the aspect of a miniature Grand Central Station. From Sydney, Australia, came Fred Rich, sound chief for the Greater Union Theatres. Rich has been in this country for the past few months absorbing the latest in American film projection techniques. He plans to remain here for several more weeks, sailing then for England where he will spend some time with Gaumont-British technicians.

Visitors from IA Locals included Horace Evans, Local 219, Minneapolis; Leon Charlip and Tom Hoad, Local 173, Toronto; Harry Kaplan, Local 182, Boston; A. E. Bradshaw, Local 175, Tacoma, and Jack Belke, Local 110, Chicago, and Motiograph representative. We also received visits from Herb Griffin, International Projector Corp.; Bill Kunzmann, National Carbon Co.; Father Robert Boelcke, St. Marys College, North East, Penna., and Nate Stein and Phil Hitter, Grand President and Grand Secretary, respectively, of the TMA. Incidentally, Hitter and Stein were recently made admirals in the Nebraska Navy.

• We were sorry to hear of the plight of Frank Welsh, former president of Wichita Local 414. He has been in failing health for quite some time and, from reports reaching us, we do not think he

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ever will be able to go back to work. Frank has been an IA man since 1910, becoming a member of the Wichita Local in 1914. He served two terms as president of the Kansas State Federation of Labor, and has been a member of the Kansas State Advisory Board since 1942. Prior to his illness Frank was chief projectionist at the Fox-Miller Theatre.

- Although the Texas Federation of Labor for the past 50 years has maintained a traditional hands-off policy towards politics, action was taken at its 50th convention in Fort Worth last month to endorse political candidates whose records show a consistently friendly and sympathetic attitude towards organized labor. "We are not going into politics because we want to," stated Harry Acreman, Federation secretary, "but we must in self-defense."

This is the new battle cry of labor organizations throughout the country. They

are determined to fight the vicious Taft-Hartley and other anti-labor measures, but this can be accomplished only with the willing cooperation of every organized craftsman. Check the records of the candidates *before* casting your ballot. Your vote is your most potent weapon against anti-labor lawmakers.

- Morris Rotker, president of the 25-30 Club, last month became a grandfather for the fifth time in as many years. Seems to be a habit with the Rotker clan.

- Police Lt. Frank A. Starkey, Hartford, Conn., former State police motion picture theatre inspector, died recently at the age of 45. His funeral was attended by many leaders in theatrical circles.

- Congratulations to Sam Lamasky, business agent of Chicago Local F-45 on the marriage of his daughter, Ruth Shirley, to George D. Warren. As a prospective grandpop, we bid Sam welcome to our ever-widening group of AK's.

- **ECONOMIC NOTES:** A large Mid-West theatre circuit is firing ushers as part of an economy drive. Meanwhile, in a 20th Century-Fox stockholders' action in New York, Charles Skouras, head of National Theatres (West Coast chain) was forced to accept a maximum annual salary of \$360,000 until 1954, as contrasted

with a salary of \$1,314,250 for 1946-47 combined, plus untold lush taking through maneuvers involving company stock which National execs voted to themselves.

We solicit your pity—for the ushers.

- Plans for the next TMA (Theatrical Mutual Association) convention are now taking definite shape. Nate Stein and Phil Hitter, Grand President and Grand Secretary, respectively, informed us last month that the convention will take place in New York City, July 1949. Willie Noon has been appointed convention chairman and is striving mightily to make the 1948 meeting the best-managed affair in the history of the TMA.

TMA officers are making a determined effort to regain for this organization its former strong position in the amusement field. New lodges are being formed throughout the country, the latest being in Tarentum and in Pittsburgh, Penna.

25 Years Ago—August 1923

- IA President Shay negotiated new contracts for road men calling for a weekly increase of \$12.50, boosting the projectionists' pay to \$75 per week. . . . The Third District (New England) held its annual outing at the Hummocks, a famous shore resort in Rhode Island. . . . Rumblings were heard of a general strike of all IA Locals. Fortunately, the necessity for a strike call passed. . . . All members of the Alliance were assessed \$5. . . . Representative Sherman rushed to Charleston, S. C., to adjust troublesome matter. This is where the famous "Sherman, Grant or Lee" quotation was born. . . . Special meeting of the General Executive Board was held of the IA's New York City headquarters. . . . Jurisdictional dispute between Vancouver Local 348 and Calgary Local 302 was brought before the General Executive Board for settlement. . . . General Offices were kept open Sundays in order to give prompt attention to communications pertaining to expiring and new contracts. . . . International representatives keep busy adjusting difficult situations.

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being lured away by non-theatre entertainment, the service Altec performs in my theatres actually preserves my assets. It adds to my assurance to know that Altec devotes its efforts one hundred percent to improving my business, and does not spend its energies in other fields."

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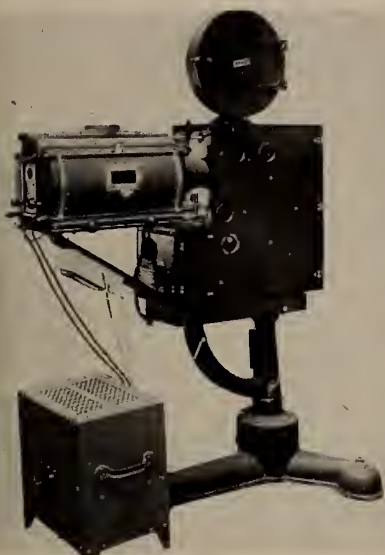
LOCAL 421, HERRIN, ILL.

Peyton Burkitt, *pres.*; Ed Shannon, *bus. mgr.*; Joe Pirka, *sec-treas.*; Charlie Barekman, *del. IA Convention.*

LOCAL 581, BATAVIA, N. Y.

William Pickert, *pres.*; Herman Gabriel, *sec.*; Henry O. Taber, *treas.*; Gerald R. Henderson, *bus. agent.*

Simplex SP Projector Again Available in Domestic Field



Simplex Type SP sound projectors, first a "war casualty" and later restricted to the export market, are again available for domestic distribution. This is an ideal equipment for the small theatre and it also fills the bill for 35-mm projection in churches, schools, institutions, etc.

The SP projector may be used with either a simplified high-intensity carbon arc light source (20 amps at 29 volts with a 1 Kw rectifier) or with standard Mazda lamps; also with low-intensity arcs, if desired. The SP is readily adapted to the Simplex 4-Star Type E sound system, including backstage equipment, to provide standard professional results.

Tv Impact Upon the Box-Office

More light was shed on the impact of Tv upon the theatre box-office by a survey conducted by the magazine *Television*. The survey question was: "Since you have your television set, do you find that you go to the movies more often, less often, or just as often as before?"

Of those queried 62% said that they went to the movies *less often*. There was no appreciable difference between men and women. Here are the survey results:

	Men	Women	Av.
More Often	—	—	—
Less Often	63%	61%	62%
Just as Often	36	33	35
Never Go	1	6	3

These results, *Television* points out, compare favorably with those of Dr. Thomas Coffin, of Hofstra College, who conducted personal interviews of 135 Tv families and 135 non-Tv families in Hempstead, representative Long Island, N. Y., suburban community. He found that 58% reported a decrease in movie attendance. A telephone survey conducted by Foote, Cone & Belding, ranking national advertising agency, revealed that of 415 Tv set owners 51% attend the movies less often, 48% attend with

about the same frequency as before, and 1% more often.

The F. C. & B. study also attempted to find out who the people were who go less often. They therefore asked how often they go to the movies *now* and *before* they acquired Tv sets. The results for the 211 who reported a *decrease* in movie attendance are as follows:

	BEFORE	AFTER
Every Few Days	57%	4%
Once a Week	33	39
Every 2-3 Weeks	7	28
Infrequently	3	29

These and other survey results published in IP are highly indicative not only of what

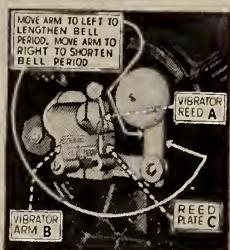
is happening *right now* but also of what will happen to theatre box-offices as the mushroom spread of Tv sets approaches the saturation point.

Czech 25 f.p.s Projection Speed May Spread Through Europe

New standard projection speed for 35-mm film in Czechoslovakia is 25 frames per second, replacing the American standard of 24 f. p. s. heretofore accepted throughout the world, the SMPE has been notified. The Czechs ascribe the change to the increasing use there of synchronous projector motors on 50-cycle a-c, but its easy adaptation for

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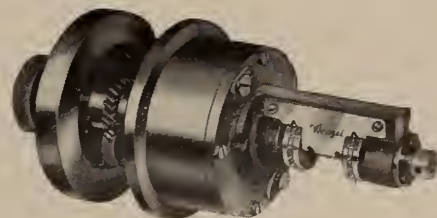
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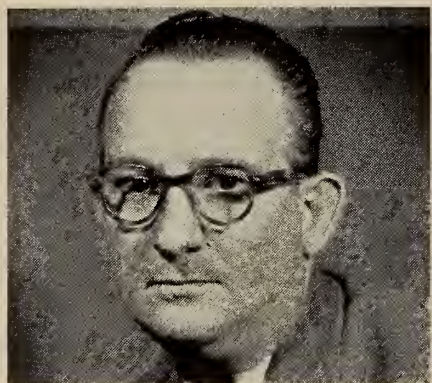
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television work is also believed to be a factor in the decision.

Representing a speed increase of about 4%, the 25 f. p. s. rate would "murder" American soundfilm recording, rendering low-tone dramatic passages grotesque. The SMPE is conducting tests to determine exactly the effect of this speed change on U. S. films.

Many other European countries are using 50-cycle rather than 60-cycle power, and it is possible that these countries may adopt the 25 f. p. s. as a projection standard, particularly in view of its ready adaptability for television work.



STEWART R. MARTIN—Treasurer and General Manager, Embassy Newsreel Theatres, New York City, and Newark, N. J.—says:

"Good sound is as important as a good news shot. We use RCA Service to keep our sound operating at peak efficiency."

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'End-Gripper' Clamp Serves Dual Purpose on Magnarc

Changing screen illumination from a crisp white to blue, accompanied by a sudden rise from a normal 60 to 70 and more amps, occasioned the development of a new type positive carbon clamp, the End-Gripper, for Peerless Magnarc lamps. End-Grippers are made by Carl E. Graham, IA Local 671, Canton, Ohio.

Carbons cracked for a portion of their length permit the escape of gases which form the white arc gas ball and result in a blue screen image. Positive travel in the Magnarc is 10", while the carbon itself is 14" long, thus the positive when first inserted must be so gripped as to risk cracking.

The End-Gripper compensates for this difference in arc travel and carbon length by having 4" more built into it. It accepts a 14-inch positive, gripping it by its extreme end and never touching it along its usable length. The sliding member of the End-Gripper remains fixed until 4" or more of carbon are consumed, whereupon the entire positive assembly is moved to the right and the sliding member is moved to the left as far as it will go, which is 4".

Carbon-Saver Role; Extra Resistance Nil

Then the End-Gripper performs as a carbon-saver, in position to feed the stub through the V guide and allowing it to be burned down to less than 1". The sliding member, of cold rolled steel and cadmium plated, comes in either 7- or 8-mm sizes and is easily replaced.

A compression-type coiled spring inside the casting to the right of the 5/16-inch Peerless stud holds the device in place and exerts a light upward pressure against the device, forcing a downward movement of the carbon and keeping it riding in the V guide. The extra resistance placed in series with the arc by this device amounts to an

infinitesimal .0013755 ohm, as measured by a Kelvin bridge.

U. S. distribution of the End-Gripper is through Graham at 1224 Homedale Ave., N. W., Canton, 3; while Canadian manufacture distribution is handled exclusively by George Jones, Secretary of IA Local 173 at 167 Church St., Toronto, 2 (this latter for the benefit of L. U. 173's Sick Fund).

Ballantyne Buys Gardiner Projector

The Ballantyne Co., of Omaha, Neb., has purchased all patents, tools, dies, etc., relating to the manufacture of the projector heretofore manufactured by L. J. Gardiner Co. of Columbus, Ohio. Ballantyne plans to effect several changes in the Gardiner projector and to merchandise it under the former's Royal Soundmaster trademark. Distribution plans will be announced shortly.

MONTHLY CHAT

(Continued from page 3)

bound them so closely to their best business asset.


Time was when these manufacturers were continuously on the move around the country, returning to their plants only long enough to whip up an improved product. Then it was back to the hustings, where the promotional effort invariably took the form of sponsoring a meeting of the craft, usually late at night, where not only his equipment but all manner of projection topics were dissected.

Such sessions were all to the good for the projectionists, true, but they were better than good for Joe Manufacturer in terms of something more than sales: he filled his noodle with beaucoup projection lore straight from the fountainhead that enabled him to build a better product.

It's no secret that numerous pieces of projection equipment when first introduced were so lacking in functional worth as to be ridiculous—that is, until the projectionists got to work on them and turned the manufacturer down the path of righteousness—and profits. Yes, we could include in this list of non-functional equipments a couple of noted projectors of today plus a raft of accessory units.

So axiomatic is it that projectionist preference is so potent as to determine the merchandising success of an equipment that one marvels at the ineptitude and short-sightedness of manufacturers in neglecting them for so long a period. Why, one prominent manufacturer was known to check into a hotel directly across the street from one of the best practical projectionists in the business—who, incidentally, had nothing but orders to hand out—and never even called him on the phone. (Item: the manufacturer sold no equipment.) In any event, it seems that the moment these manufacturers became the least bit affluent they proceeded to ignore priming the pump that produced their affluence.

Certain manufacturers do maintain a



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field staff, of course, but this staff is concerned primarily with dealer contact and emergency trouble calls, with the latter usually being the result of a series of frantic importunings by projectionists.

Manufacturers with projection equipment to sell would do well to return to the merchandising fundamentals which enabled them to get started and keep rolling—the cultivation on a basis of easy informality of the man who uses their product, the projectionist. That manufacturer whose activities launched this combination of words is a smart cookie—as will be attested to by his sales sheets.

BRITISH PROJECTOR DATA

(Continued from page 19)

allow for lens mount—disturbs the otherwise good symmetry of the job. The door, incidentally, can be lifted off for the convenience of those British projectionists who do not take kindly to an enclosed mechanism.

Massive Enclosed Gearing

Once the door is opened, however, the result of many years of successful projector research is at once obvious, for the sprocket sizes, pad roller and arms, film-trap door pads and parallel gate are obviously of American origin; and the upper film-trap guide rollers and intermittent film-guide assemblies are definitely reissues of parts fitted to earlier Kalee projectors with much success.

One is impressed by the massive gears on the projector and the usual "sun and planet" intermittent movement, all of

New RCA Test Oscillator

Portable "flutter indicators" and similar instruments used by theatre servicemen may now be quickly and accurately calibrated and tested by means of a new electronic test instrument developed by RCA. This frequency-modulated audio oscillator overcomes limitations of mechanical instruments previously used for this purpose.

A major problem in recording and reproducing sound has been that of attaining constant speed at the recording or scanning point to eliminate "wows," flutter, and other undesirable effects. This has been achieved by reducing variations in speed below the level of audible disturbance.

To ensure this low noise level in theatre sound systems, various test instruments have been developed. To calibrate the flutter-indicator instruments, motor-driven capacitor-oscillators were used. These, however, suffered from a number of deficiencies.

RCA's new test oscillator is free from amplitude modulation effects and provides excellent frequency stability, good output wave-form, long-time constancy of calibration, and rapid checks of flutter-bridge scale markings. It may be readily modulated at any low audio frequency and with any wave-shape desired by using an external modulation generator.

which are made with the usual Kalee thoroughness and finish. The projector gears run in an enclosed casework, with the working parts visible through a perspex window. The machine is lubricated by means of the tried and proven Kalee pump system.

The soundhead assembly is driven by an a-c motor using two V belts; this represents a definite advance over many quick-starting jobs—some of American origin—for the machine starts slowly and no unnecessary strain is placed on the mechanism.

The arc lamp, using a 16½-inch mirror, is massive and handsome externally. It has several good features which, although not necessarily original, contribute much to its efficiency. Individual impressions will, no doubt, vary regarding the general layout of the controls, for the distance from the rear of the lamphouse, where several controls are placed, to the arc circuit switches on the main stand is considerable.

Summing up these brief impressions

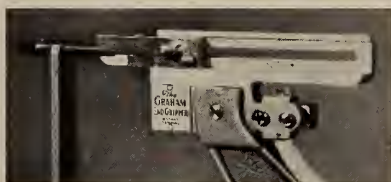
of the GK 21, the workmanship is of a high order, the machine runs very quietly and smoothly and it is of handsome appearance. Regarding accessibility for service, it is a really sensible job of work.

The Ross Projection Apparatus

In Britain the name Ross has usually been associated with many things of an optical nature. In projection work, reliability and screen results have been the principal aim of this firm. While the general design of the Ross has not been very modern, its overall performance has earned Ross a good record for reliability and service.

The new Streemlite lamp is apparently efficient in performance and has been modernized in appearance; and the Ross GC projector—the choice of the British Army garrisons during the War—has proved its worth.

While essentially a British product, the Ross has some points which are reminiscent of American design. Teaming up with RCA on the sound equipment, Ross



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is forging ahead, and the overall result is a good combination for picture and sound.

The Westar projector is an exact copy of the U. S. Century machine. It appears to run quite nicely, is very accessible for



T. J. VERMES—Partner, Yale, Norwood and Yorktown Theatres, Cleveland, Ohio—says:

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service, but it is somewhat lightly built. It has not yet appeared in sufficient numbers for an opinion to be formed as to its reliability in service. If this projector is as good as its American counterpart, however, U. S. projectionists will need little information regarding it. This machine is being fitted to the Westrex sound system by Western Electric.

In mentioning the Walturdaw Five, one instinctively thinks of the German Ernemann projector, for apart from one or two slight modifications, this machine is an exact prototype. It is sturdily built and is, of course, of characteristic continental design and of the open type. With water-cooled film trap and eight-frame upper and lower sprockets, the Walturdaw has a smooth and well finished appearance. It is of very sound design and quite accessible for operation.

As in the case of the Westar job, the Walturdaw Five has yet to prove its worth in its present form. If, however, the quality of manufacture and silent operation associated with the name of Ernemann are equally attributable to the Walturdaw mechanism (and there is no reason to suppose otherwise) then its future is assured.

In passing, it should be mentioned that RCA and Western Electric are both using American-designed. British-made sound

equipment, and it is of top quality in every way.

Summarizing, all the British machines are of sound basic design and very attractive in appearance. The preference in favor of one or the other depends on individual taste, much in the fashion of choosing an automobile. Regarding comparison with American machines, well, as far as screen results go, they should be as good; but one cannot expect any projector to surpass in screen excellence the achievement of many pre-war U. S. machines which still are putting over perfect performances in Great Britain.

Comparison With U. S. Units

The question of replacement parts and rapid service, however, is one which our British manufacturers will have to watch, for the changing of design every few years has in the past been a headache to all concerned. Here is where U. S. machines have scored, for even today—on 20-years-old machines—repairs can be executed quickly and the standardization of various parts has proved that the original designs were good.

WHITHER THE M. P. THEATRE?

(Continued from page 5)

would have to be titanic, to say the least, to succeed.

Such a theatre, of course, would have to utilize Tv equipment as an adjunct to its regular program for the covering of spot news and events of surpassing importance, so that their audiences would not be left wholly out in the cold.

There's no question, of course, that a nation-wide string of theatres could outbid any video network or any advertiser, or any combination of the latter, for sporting and other special events. The hitch here, however, is twofold: how would the program be transmitted to the theatres? and how many such events are available to a theatre during the course of a year? And how about the difference in time zones?

The utilization of Tv by the motion picture theatre would mean simply a change in the present distribution system for film programs—through the ether instead of by cans of film transported by truck, express or plane. But this contingency need occasion no concern here, because the motion picture industry hasn't any transmission facilities, open or closed. And why bother about etherizing programs when the job can be done much better on film?

The point being made here is that while one branch of the industry is busily engaged in insuring its future economic health—possibly for a financial killing—the exhibition field as a whole is just drifting along and doing not a damned thing about a development, which could easily encompass its destruction.

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PROJECTOR MAINTENANCE

(Continued from page 8)

Sluggish or uncertain action of the fire shutter must not be tolerated.

G. INTERMITTENT MOVEMENT

[Note: All adjustments of the intermittent are made with the unit removed from the projector.]

1. *End-play in intermittent sprocket shaft.* Correct end-play by taking up the bearing collar—the outboard bearing in most double-bearing movements. Avoid too tight an adjustment. Tighten cover screws securely.

2. *Backlash in intermittent sprocket.* If backlash or “lost motion” be detected when the sprocket is in the “locked” position, loosen cover screws and readjust the position of the cover so that star and cam are properly meshed. Tighten cover screws and test by turning flywheel by hand before replacing in projector. The flywheel must turn freely, and there must be no clicking sounds or binding when the sprocket starts to move.

3. *Noisy operation.* A correctly adjusted intermittent unit is completely silent in operation when the machine is run without film and the film gate is open. If noise is heard, remove the unit and readjust. (Certain modern intermittents provide a flywheel adjustment which must be made according to the manufacturer's instructions.)

4. *Check intermittent sprocket for wear.* See C-1 for tests. Replace sprocket even if only the slightest trace of wear or damage is apparent. Remove taper pins with a pin-pusher; replace pins with V-block and drive punch, applying only the lightest blows. Replace old-style 0.935 sprockets with the more satisfactory 0.943 inch type.

5. *Check oilwell for leaks.* Leaky star-shaft bearings are very rare, most oilwell leaks being due to defective gaskets. Replace the cover gasket with a new one, being careful not to tear it. The honing or grinding of marred case or cover surfaces by the projectionist is not recommended.

H. ROTATING SHUTTER

1. *Timing.* Use special test film or preview trailers containing an abundance of titles for detecting travel-ghost. Observe ghost from auditorium, or else remove glass from observation ports. If ghost extends upward from tops of bright objects, shutter is “late”; if downward from bottoms of bright objects, shutter is “early”.

Turn machine very slowly by hand, and when the intermittent sprocket is midway in its travel (when $2\frac{1}{2}$ “spaces” between teeth have passed a fixed reference point) the projector is stopped and the shutter set so that a blade covers the lens or aperture completely. If up-and-down ghosts appear simultaneously, increase the width of the shutter blades.

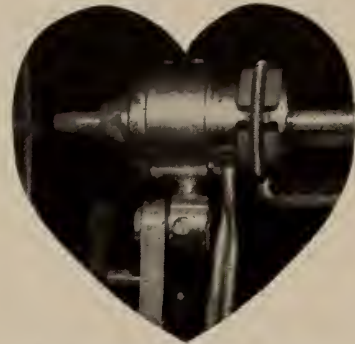
2. *Check rear shutter blades for warp.* If the hot light beam from the arc is allowed to fall upon a blade of the rear shutter in a motionless machine, the blade may be warped out of shape to

the extent of striking the shutter shield when the motor is switched on. This invariably results in a stripped fiber spiral shutter gear.

3. *Check shutters for backlash and*

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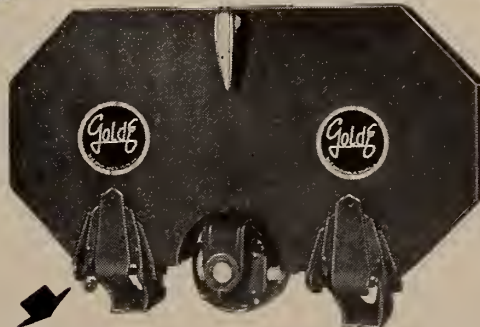


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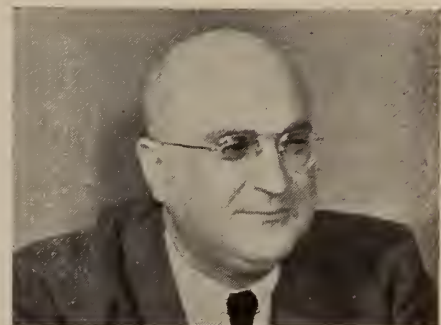
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end-play. Correct excessive backlash by installing new gears and tightening all set screws; end-play by adjusting the shutter-shaft stop-collar.

I. LOWER SPROCKET, PAD ROLLERS

1. *Check for wear and incorrect alignment.* See C-1 and C-2.

2. *Alignment and clearance of pad rollers.* See C-3 and C-4, but adjust only the left-hand lower sprocket pad roller for clearance, ignoring the right-hand roller in this particular if it turns at all when film is running.

J. LENS AND FOCUSING MOUNT

[*Note:* The use of "micrometer" focusing screw attachments on the older projectors having focusing levers is not recommended by the writer. There is far too much backlash in such devices.]

1. *Check for looseness.* Tighten slide screws if lens mount is too loose. (These are reached from the gear side in most projectors.)

2. *Lens tube.* If tightening lens-holder screws or knurled nuts fails to secure the lens, install proper shims.

3. *Check lens for dirt and oil-fog.* Avoid the use of all lens-polishing pastes. They are dangerous. Clean soiled lenses with a weak soap solution and dry gently with clean cotton cloth or lens tissue.

K. THE GEAR TRAIN

1. *Check gear shafts for end-play.*

2. *Check gears for wear and backlash.* Do not wait for projection quality to deteriorate before replacing worn gears.

3. *Check and tighten all gear set screws and taper pins.*

4. *Remove dirt and grime from gears.* Remove accumulations of grime with a lint-free cloth soaked in kerosene, and then relubricate the gears. Do not give the entire mechanism a "kerosene bath," as some have recommended. Use no graphite in any part of the mechanism.

L. SOUNDHEADS

1. *Check soundgate tension in old-style soundheads.* Insufficient tension may cause flutter in soundheads which employ "impedance rollers" of the old type.

2. *Check tension pads for wear.* Certain of the older soundheads employ watch-spring pads which quickly wear dangerously thin. Replace *before* they break and stop the show.

3. *Check old-style soundgates for dirt.* Loss of volume and "husky" distorted sound result from dirt deposits in the soundgate. When cleaning do not remove the optical unit or its support unless the focus is to be readjusted.

4. *Check sound sprocket for wear.* See C-1.

5. *Check rotary stabilizers for dry bearings.*

6. *Check guide roller assembly for worn pads, insufficient pressure and in-*

correct alignment. Buzz-track test films are used for aligning guides (any type).

7. *Exciting lamp.* Check condition of socket and all electrical connections. Check for focus, sagging of filament, blackening of glass envelope. Discard blackened exciters.

8. *Check photocell lenses and mirrors for cleanliness.*

9. *Check takeup sprocket for wear.* See C-1. Loud "singing" of the take-up sprocket also indicates wear, but some noise is unavoidable on a certain old-style base which has the take-up sprocket in the lower magazine, with no rollers interposed between it and the reel.

M. LOWER VALVE ROLLERS

[*Note:* See the notes given in Section B. The film chutes of old-type bases require special attention.]

N. LOWER MAGAZINE, TAKEUP UNITS

1. *Check spindle shaft for wear.* See A-1.

2. *Check reel key and jack for wear.*

3. *Check takeup belt.* Examine carefully the condition of the leather and of the coupling staple. The belt should be very tight: eliminate all slack unless a tension roller is used. Wipe all grease from belt with a cloth dampened with Carbona.

4. *Takeup chain.* When chains and sprocket wheels are used, check frequently for wear. Chains should be cleaned occasionally and lubricated with heavy gear grease. Cup grease and oil are rapidly thrown off.

5. *Leather friction disks.* Remove the takeup shaft and clutch and take the

assembly completely apart. Wash disk and clutch surfaces with Carbona, lightly oil only *one* side of leather disk, and reassemble. Replace disk if leather is cracked or abraded.

6. *Check takeup tension.* Place an empty reel in the lower magazine and switch projector motor on. Feel tension by holding back reel with one finger. Then place a loaded reel containing a full 2000 feet of film in the lower magazine and turn the motor on.

If the reel does not turn and pick up full speed within a few seconds, increase the tension. If a loud tearing or buzzing sound is heard at the lower sound-head sprocket during normal operation, particularly at the beginning of a reel, the takeup tension may be too great.

O. PROJECTOR MOTOR AND SWITCH

1. *Check pickup time.*

2. *Check motor starting.* Faulty starting action is usually due to a damaged or dirty centrifugal cutout. The motor should be dismantled, cleaned, oiled, and reassembled. All electrical connections should be checked.

3. *Check projector motor switch.* Switches suspected of defects should be dismantled for inspection. The electrical, labor, or insurance department of your city or State should be notified when new switches are found to be faulty.

Remember that there is no quicker way to wear out a projector switch than to "run down" film with the motor instead of by hand when checking threading. Faulty switches have been known to cause the stripping of gears in projectors which pick up speed too rapidly.

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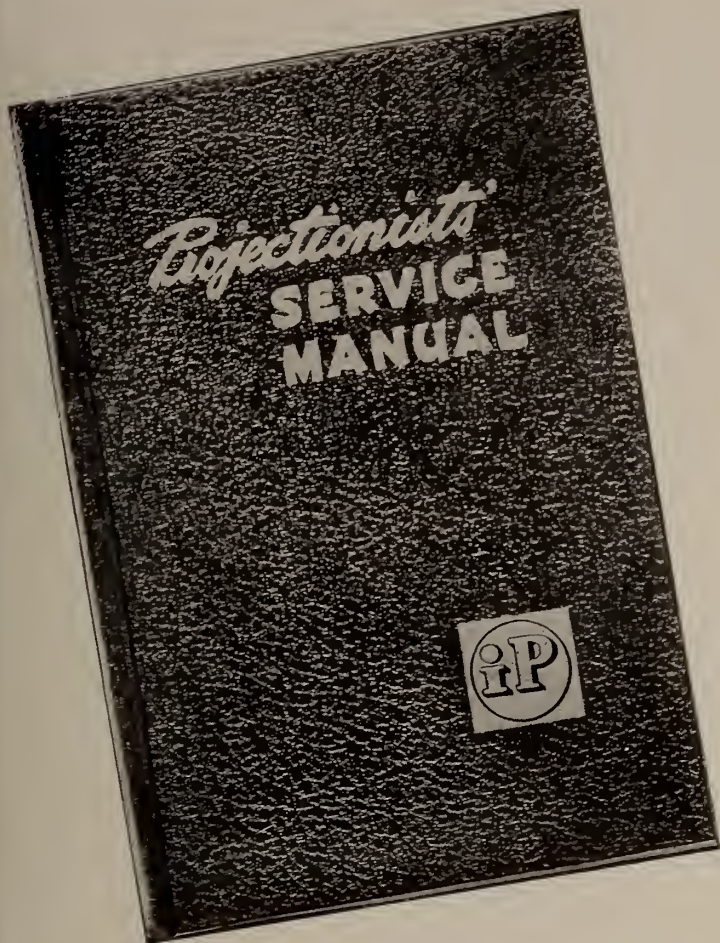
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HENRY B. SELLWOOD, *Editor*

Volume 23

SEPTEMBER 1948

Number 9

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MONTHLY CHAT

FOLLOWING the publication herein last month of assorted gripes by both projectionists and exchange workers relative to the basic causes for the wide-spread and steadily increasing degree of film mutilation in the exhibition field, a representative of IP did a bit of snooping in several exchanges and theatres in the Eastern territory in an effort to get the low-down on this situation.

Exchange managers complain of the terrific labor turnover, widespread absenteeism and a "general shiftlessness" on the part of their workers, but they will not admit that these factors reflect unsatisfactory working conditions compounded of low wages, skeleton crews, cramped working quarters, the speed-up system and defective shipping cases and reels.

IP's investigation supports the contention that exchange workers have a legitimate beef on the score of working conditions. These workers, however conscientious when they go on the job, speedily get the idea that *quantity* not *quality* of work is the controlling factor in their daily jobs. "How many reels per day" is the managers' chief concern—and how the workers know it!

Exchange managers point to the record of no film fire in an exchange for more than a year a "conclusive" proof that working conditions could not possibly be as bad as they are painted by the workers. When reminded that there exists no need in an exchange for unbroken continuity of film projection nor for the use of high-intensity arc lamps, the managers merely shrug it off. One manager had the temerity to inquire whether "those punch artists were too lazy to make a few splices or do they want the exchange people to go into the theatre and run the film for them."

The plight of the exchange workers is something that appears to be beyond the reach of a helping hand on the part of projectionists; but the latter can do plenty to protect their own interests on the theatre front. Yes, it's that old pet plan of IP which, incidentally, has been adopted by several projectionist units:

Every foot of film that reaches the projection room should be subjected to close inspection, with the findings thereon being entered on a duplicate form one copy of which goes to the management and the other being retained in the projection room. Prominently displayed on this form should be a disclaimer of any responsibility on the part of the projectionist for any "untoward happening" as a result of such film deficiencies as may be listed.

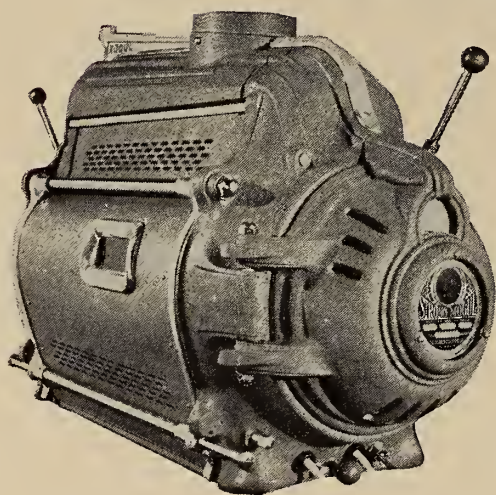
Granted that this procedure may not improve the quality of prints from the exchanges, but it will aid the projectionist by uncovering defects which might be a potential danger to his safety.

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Photometric Units in Projection

RECENT officially sponsored investigations of screen light levels have aroused widespread interest among projectionists in the scientific aspects of projection lighting and screen characteristics. The projectionist is, as ever, an artist who "paints" his pictures with light; but he is a technician, as well, and accordingly can ill afford to ignore scientific methods of evaluating results on the screen.

Most projection textbooks currently available offer small comfort to a craft continually confronted with the technical terms of photometry. The recent unflattering report of the SMPE Screen Brightness Committee¹ points up the necessity for a clear comprehension of such units as the lumen, the footcandle, and the footlambert. Those projectionists who know the basis of these units did not gain their knowledge from the fat volumes which are offered the craft as the "last word" in projection literature.

¹ See IP for March, 1948, p. 16.

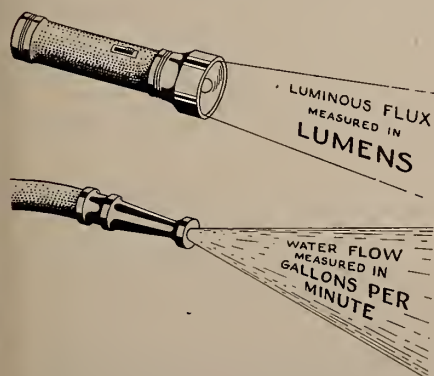


FIGURE 1

By ROBERT A. MITCHELL

The term *luminous flux* refers to the amount of light "flowing" in a beam. In fact, the word *flux* means "flow". If we compare a beam of light with a stream of water issuing from the nozzle of a hose, the practical meaning of luminous flux becomes quite clear. In the case of a stream of water, the rate of flow is measured in gallons per minute. Luminous flux (light-flow) is measured in *lumens* (Fig. 1).

Exposition of the Lumen

All of us can readily visualize gallons per minute, for both gallons and minutes are familiar units. But it is not difficult to appreciate the value of the lumen.

Suppose we set up a 1-candlepower source of light (such as a "standard candle") and place a curved surface whose area is 1 square foot exactly 1 foot distant from the light. If the curvature of the surface is correct, all points upon it will be one foot from the candle flame, as in Fig. 2.

Now, the quantity of luminous flux intercepted by the square-foot surface is 1 lumen. We may squeeze the lumen of light into a very narrow beam by means of lenses or mirrors (increasing the brightness of the light) or spread it out over a large screen (decreasing the

² Scientists define the lumen in slightly different terms. Because the curved surface in Fig. 2 is merely a 1 square-foot section of the surface of a sphere whose radius is 1 foot, and because 1 square foot is $1/(4\pi)$ of the total area of a sphere 1 foot in radius, the lumen is $1/(4\pi)$ (approximately 0.0796) of the luminous flux emitted by a source of 1 candlepower.

Conversely, a source of 1 candlepower emits a total of 4π (approximately 12.5664) lumens.

brightness) but the rate of light-flow remains 1 lumen, no more and no less.²

A lumen, then, is really a very small quantity of luminous flux. No wonder that projection lamps must throw out from 5,000 to 20,000 lumens to project pictures of satisfactory brilliance on theatre screens!

If you are one of those who wish to have facts down pat in the form of rules or equations, here is a formula which gives the total number of lumens emitted when the candlepower of the light-source is known:

$$\text{Lumens} = 12.5664 \times \text{Candlepower}$$

A stream of water may either move along sluggishly or have considerable "force" behind it. So with light, for a beam may be either weak or intense. Water pressure is measured in pounds per square inch, but light intensity is measured in *footcandles*. The term "foot-candle" is almost self-explanatory. Any object placed exactly 1 foot from a light-

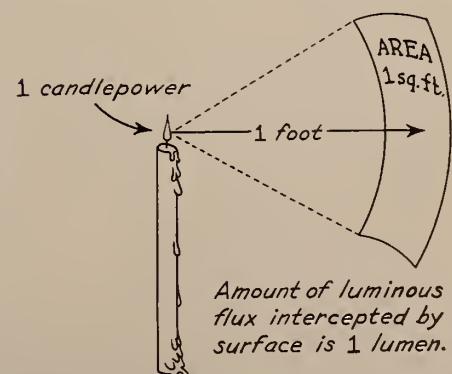


FIGURE 2

source of 1 candlepower receives illumination of 1 footcandle intensity.³

It is easy to see that an object held 1 foot from two standard candles receives 2 footcandles of illumination. But suppose that an object is placed 2 feet away from only *one* standard candle. What intensity of illumination falls upon the object? In order to find out we must invoke the *law of inverse squares*.

It is common knowledge that a surface close to a light source is more brilliantly illuminated than a surface farther away. The law of inverse squares tells us very precisely and simply how illumination varies with distance. This law states that "the intensity of illumination (footcandles) varies inversely as the square of the distance from the light-source." Hence:

$$\text{Footcandles} = \frac{\text{Candlepower}}{(\text{Distance in feet})^2}$$

An object held 2 feet from a 1-candlepower source receives only 0.25 of a footcandle because the square of 2 is 4, and 1 divided by 4 is 0.25. The optical train of a motion picture projector "cheats" the inverse square law by bending light rays with mirrors and lenses.

But it is not at all necessary to know the intrinsic brightness of the light-source (candlepower) in order to calculate the change in illumination upon a surface when the surface is moved away from or toward the light. To find the footcandles the surface receives in its final position, we multiply the footcandles received in its initial position by the square of the initial distance, and then divide the product by the square of the final distance. In the form of a formula:

$$\text{Final Footcandles} = \frac{\text{Initial Footcandles} \times (\text{Initial Dist.})^2}{(\text{Final Distance})^2}$$

This formula is useful for solving such problems as: "If a screen is illuminated by 30 footcandles 75 feet from the projector lens, how many footcandles will the screen receive at 100 feet?" Work this through, using the foregoing formula, and you will find the answer to be 16.875 footcandles.

The illumination projected upon a motion picture screen by a projector running without film should not average less than 15 footcandles. Anything less than this is inadequate. The footcandles of illumination may be calculated when the light output of the projector in lumens is known:

$$\text{Footcandles} = \frac{\text{Projector Lumens}}{\text{Screen Area in Sq. Feet}}$$

If two cards, one white and one black,

³ The footcandle may also be defined as the intensity of illumination provided by 1 lumen distributed uniformly over an area of 1 square foot.

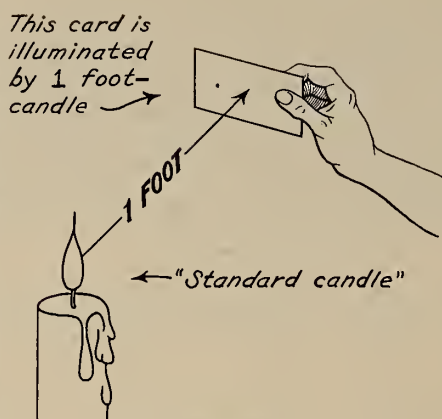


FIGURE 3

be illuminated by the same number of footcandles, the white card will, of course, appear brighter than the black card. The black card appears darker than the other because it absorbs more of the light, and hence reflects less of it back to our eyes. The brightness of extended surfaces is measured in *foot-lamberts*.

The ability of a screen to reflect light is called its *reflectance*. A perfectly reflecting screen has a reflectance of 1. A screen that reflects only half the light falling upon it has a reflectance of 0.5. Most matte screens which have been in use for some time have an average reflectance of about 0.8.

If a screen having a reflectance of 1

be illuminated by 10 footcandles, the average degree of brightness is 10 foot-lamberts. If, however, the reflectance be 0.8, the brightness is only 8 foot-lamberts—not enough for satisfactory projection.

$$\text{Footlamberts} = \text{Footcandles} \times \text{Reflectance}$$

When a screen of 0.8 reflectance is illuminated by 15 footcandles, the brightness is 12 footlamberts, which figure may be taken as the lowest acceptable limit of screen brightness. Those who protest that this minimum is too high must be reminded that today's projection standards are higher than those of the past.

The light output of a projector in lumens required to produce a desired screen brightness depends, naturally, upon the area and average reflectance of the screen surface. Projector light output is measured with the projector running, but without film:

$$\text{Projector Lumens} = \frac{\text{Footlamberts} \times \text{Area in Sq. Ft.}}{\text{Reflectance}}$$

For a screen 12 by 16 feet and having an average reflectance of 0.8, the projector must pour 2,880 lumens from its lens in order to provide 12 footlamberts of screen brightness. Because of shutter, aperture and lens losses, the lamp employed must emit approximately three times this flow of light—say 9,000 lumens.

Magnetic Recording Advances Promise Extensive Use for Film Work

MOST people who have read about magnetic recorders think this is some new type of recording, a very recent development or a method developed for some particular need during the war. Very few realize that the first magnetic recorder was built prior to the beginning of the twentieth century along with mechanical and optical sound recorders.

Shortly after Edison invented the mechanical phonograph in 1877, a Danish physicist, Valdemar Poulson, began experimenting with magnetic recording. In 1898 he obtained his first patent on a magnetic wire recorder. Although this recorder was comparable in performance with other sound recording devices of that time, and although many experimenters have continued work in this field, the development of magnetic recording failed to keep pace with either mechanical or optical methods.

It is interesting to note some of the technical reasons why magnetic recording lagged developments in other recording fields. First, practically all of the early experimenters used transverse magnetization in which the recording medium

was magnetized in a direction perpendicular to its direction of motion. In transverse magnetization the pole pieces of the recording head are placed on opposite sides of the recording medium and considerable fringing of the magnetic field occurs. This results in a relatively large scanning gap, giving poor high-frequency response.

Second, the use of d-c bias by the early experimenters. Because of the non-linear transfer characteristic of all magnetic materials, some method of biasing is mandatory and the obvious method was to superimpose a d-c magnetic field on the audio field so as to operate on a nearly linear portion of the transfer characteristic.

Since the transfer characteristic is linear over only a very limited range, the use of d-c bias resulted in a small signal-to-noise ratio and the introduction of excessive distortion for signals of large amplitude.

Third, the use of poor magnetic materials for the record medium. Many

(Continued on page 34)

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Basis of the Schmidt Optical System

Current technical literature, particularly that relating to Tv projection equipment, is studded with references to the "Schmidt optical system," a term which will be frequently encountered by and have great significance for projectionists. The appended article by a member of the Philips Research Laboratory (Eindhoven, Holland) explains the "what" and "how" of this system.

When an image is formed with optical systems employing mirrors or lenses, the imperfect imaging due to aberrations often gives rise to great difficulties. Disregarding those of a higher order, there are five defects: spherical aberration, coma, astigmatism, curvature of the field, and distortion.

In 1941 B. Schmidt designed a mirror system which is corrected very well for four of these five defects, while the influence of the curvature of the field upon the distortion may usually be ignored. Schmidt introduced a diaphragm and a correction plate in the center of curvature of a spherical mirror. The great advantage of this system lies in the fact that it allows for larger apertures being used, while giving at the same time a reasonably large useful field of vision.

MOST optical instruments are designed to produce an image of an object. This image sometimes has to be enlarged, as in the case of projection lenses, or reduced, as in the case of photographic lenses; but it is always required to be sharp and conformable to the object. This requirement is not so simple: consider the fact that astronomical telescopes have already taken more than three centuries to develop and still cannot be said to be perfect. Aberrations still cause a certain unsharpness of the images and lack of conformity with the object.

If we confine ourselves to third-order aberrations, then, when using monochromatic light, there are five optical aberrations: spherical aberration, coma, astigmatism, curvature of the field, and distortion. When we work with composite light, then in addition to these five defects, we have to contend with two chromatic aberrations.

Elimination of Aberrations

Optical systems have been constructed in various ways in an attempt to eliminate these aberrations as far as possible. When there are pencils of rays making an angle with the axis, then coma and astigmatism very soon lead to large aberrations. With a parabolic mirror a large aperture can, in fact, be used, but the field of vision is small.

Another possibility is that with a spherical mirror a diaphragm is placed in the center of curvature. In directions making a fairly large angle with the optical axis of the system, some of the aberrations are avoided, just as is the case in the direction of the axis, but the spherical aberration remains. In order to limit the effect of this spherical aberration it is necessary to give the diaphragm a small aperture; in the case of

a spherical mirror with the diaphragm in the centre of curvature, one can work with a large field of vision, but one must then make the aperture small, and this means low luminous intensity.

Attempts have been made to eliminate aberrations in lens systems by combining lenses of different shapes and different kinds of glass. Thus composite lenses are formed which eliminate certain aberrations. But for an optical system with large aperture and large field of vision it is impossible to correct all aberrations at once in this way.

Often the elimination of some aberrations is accompanied by a greater effect of the others. It is particularly the aberrations of higher orders that then play a part. Even if a lens system were designed in such a way that all third-order aberrations of one part were absolutely neutralized by the corresponding aberrations of the other part, there would still be no guarantee that the image is sharp. Aberrations of the fifth and higher orders may still completely spoil the image. It is impossible to suppress

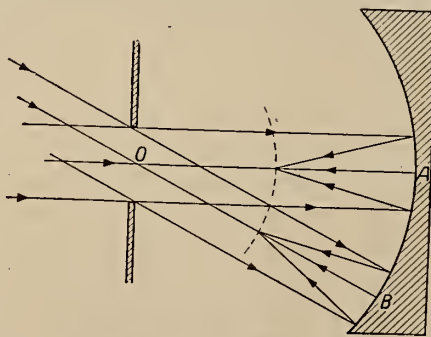


FIG. 1. A spherical hollow mirror with a diaphragm in a plane passing through the center of curvature, O. The images formed by the beams with parallel rays A and B lie on a spherical surface with $\frac{1}{2} R$ as radius, R the radius of the mirror and Q its center.

these aberrations exactly together with those of lower orders.

An important construction designed with the object of correcting aberrations as far as possible while retaining a large field of vision and extremely high luminous intensity is Schmidt's mirror system. In this system a spherical hollow mirror and a correction plate with an aspherical surface are used.

Background of the Schmidt System

B. Schmidt, an instrument-maker of the Hamburg (Germany) Observatory invented his optical system in 1931. Schmidt started with a spherical hollow mirror. This offers at once two great advantages: a mirror is perfectly free of all chromatic aberrations, and further, given equal focal distance and diameter, the spherical aberration of a hollow mirror is eight times smaller than that of a simple lens.

In the centre of the spherical mirror (the radius of which we shall call R) Schmidt placed a diaphragm. Since the direction of each incident ray can now be regarded as the optical axis, the coma and astigmatism related to the diaphragm plane are nil.

The image field for beams of parallel rays is a part of a sphere with $\frac{1}{2} R$ as radius, as is seen in Fig. 1. For photographic telescopes and various other purposes (screen photography, projectors for television receivers) the fact that we have to do with a curved image field does not constitute any great objection, for the film or the screen of the cathode-ray tube can be made spherical, so that this curvature of the field is of no effect.

If with a hollow mirror a diaphragm is placed in the centre of curvature and a spherical image field is used, then all aberrations except the spherical are eliminated, not only those of the third order but also those of higher orders.

[NOTE: Strictly speaking, there still is the effect of distortion. Since this defect is independent of the diaphragm aperture, it does not disappear even when the aperture is made small to counteract spherical aberration.]

Function of Correction Plate

The only image defect that has to be eliminated is the spherical aberration. Schmidt does this by introducing a correction plate in the diaphragm. The manner in which this correction element works is explained graphically in Fig. 2.

We assume that a source of light is placed in the focus of a hollow spherical mirror. The top half of Fig. 2 shows how the rays coming from the focus are reflected when there is no correction plate. Only the paraxial rays run prac-

tically parallel to the main axis after reflection. The greater the angle between the incident ray and the main axis, the more the reflected ray diverges from the line parallel to the main axis.

The bottom half of Fig. 2 indicates how Schmidt has eliminated this spherical aberration. We can imagine that, owing to the refraction in a prismatic piece of glass, each of the reflected rays is made to run parallel to the major axis of the mirror. All these glass prisms together then form the correction element. The division into a large number of very thin prisms is only a schematic representation: actually the correction plate has a continuous surface. In Fig. 2 the thickness of this plate is greatly magnified.

Correction Plate Positioning Vital

Schmidt realized that it is of great importance to apply the correction plate in the center of the mirror. This gives the same great advantage as mentioned previously when the diaphragm is placed in that center.

Since all the incident rays now bear the same relations in respect to the correction element, when constructing the passage of the rays through this element one may regard each direction as the optical axis. In regard to the rays not passing along the main axis of the mirror, the correction plate is not, it is true, perpendicular to the direction of incidence, but since the deflection of a ray through a prismatic piece of glass is dependent only to a very small extent upon the angle of incidence, the differences thereby arising may be regarded as an effect of a higher order.

This is more readily understood when it is borne in mind that the purpose of introducing the plate in the diaphragm is only to correct the image. The cor-

rection element is very thin, the optical strength of the system being supplied by the hollow mirror.

When owing to the angle of incidence the direction of the non-paraxial rays is slightly changed in the correction plate, this only results in a change in the correction, in contrast with the lens system where the angle of incidence of the boundary rays causes these to pass through an entirely different thickness of glass, resulting directly in a change in the image. That is why a Schmidt optical system can be used with an aperture much larger in relation to the focal distance than is the case with a lens system.

There is one other point that must be dealt with briefly here. It has been stated previously that with a hollow mirror no chromatic aberrations occur. But as the

correction plate refracts, it has dispersion and consequently gives different deviations to rays of different wavelengths. This can be taken into account when deciding upon the shape of the correction plate, taking care to keep the influence of chromatic aberration as small as possible.

Consideration must also be given to the fact that the difference in cross-section between the thickest and the thinnest part of the correction plate is very small, often not more than a few tenths of a mm, so that there need be no fear of any appreciable effect of chromatic aberration with a plate such as this.

With a parabolic mirror the spherical aberration is eliminated in only one direction; whereas with Schmidt's mirror system it is practically eliminated in all directions. Since the other aberrations

Definitions of Optical Terms

E. O. KOLLMORGEN

Kollmorgen Optical Company

THIRD - ORDER ABERRATIONS:

A technical term of interest mainly to lens designers. The exact statement of the formulas used in ray-tracing involves expressions equivalent to a series of terms in ascending odd powers beginning with 1—i. e., x^1 , x^3 , x^5 , and so on.

Equations using the first term only are employed for rough approximations; those using the first two terms (called "third-order equations" because they involve the third power) are used extensively in preliminary design and give a pretty good idea of the performance that can be expected from the system. In the final computation of a highly corrected lens, such as the Super-Snaplite projection lens, the exact values of the mathematical expressions must be employed.

A "third-order aberration" is, therefore, one disclosed by lens computation using third-order equations. There is another kind of third-order, or tertiary, aberration, relating to residual color in an apochromatic lens system, but this also is quite technical and of little interest to the practical man working in the theatre or the studio.

Spherical Aberration: In an uncorrected objective lens system, the rays from the center of the object which pass near the edge of the lens are bent more sharply than those passing near the center of the lens, and in consequence are brought to focus at a point nearer the lens itself. If the center of the object is a bright point of light, its image appears as a similar point, but surrounded with a blurred circle.

Coma: This is similar to spherical aberration, but of a non-symmetrical character affecting images of points

not at the center of the object. The blur of each image point in this case is not a circle, but a tail like a comet (hence the name) extending toward or away from the center of the image.

Astigmatism: Astigmatism, like coma, affects only the images of points off the optical axis. It is the tendency to image the object point as two short lines, mutually perpendicular and longitudinally displaced from each other. Between these two lines lies an "image," or blurr pattern, of minimum size.

Curvature of Field: In the simple case, curvature of field occurs when a flat object is imaged on a curved surface, usually concave with respect to the lens. Sometimes this aberration can be overcome by curving the object itself, as in the case of the curved slit used in sound reproduction, or the curved surface of a television tube. Curvature of field is usually accompanied by astigmatic differences.

Distortion: Distortion occurs when the magnification of the system is not uniform across the entire image. If regions near the edge of the object are magnified more than those near the center, "cushion" distortion is present, so called from the appearance of the image of a square or rectangle. If the reverse is true, the phenomenon is called "barrel" distortion.

Optical systems generally suffer, to a greater or lesser extent, from all these aberrations in combination, plus color aberration in the case of white-light illumination. The problem of the optical designer is to reduce them to a minimum; and how well he has succeeded is evident in the really excellent lenses available today to the motion picture industry.

FIG. 2. The effect of a correction plate applied to a spherical hollow mirror. A light source is imagined as being situated in the focus *F* of the mirror. The top half of the figure shows the direction given to the reflected rays as a consequence of spherical aberration; the bottom half how a correction plate bends the reflected rays in a parallel beam.

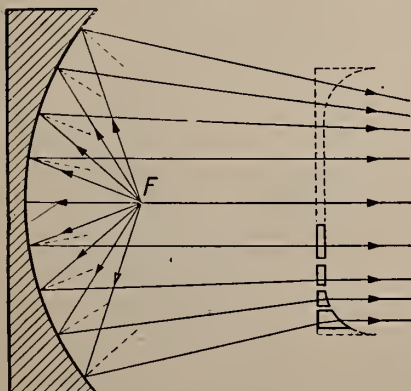
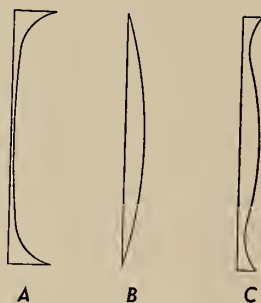


FIG. 3. (A) Correction plate for a Schmidt optical system. (B) A flat-spherical lens with which the correction plate is often combined. (C) The shape that the correction plate assumes when combined with B. The thickness of the plate is strongly exaggerated in this illustration.



(except for curvature of field) are also practically eliminated for all directions, this optical system can be used with a large aperture and, moreover, has a fairly large field of vision.

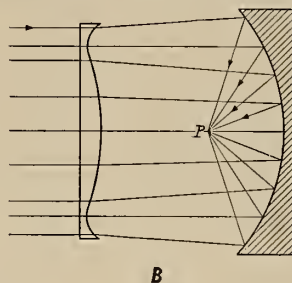
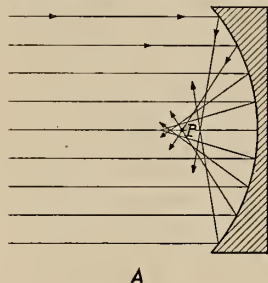


FIG. 4. (A) With a spherical mirror the rays of the beams of different distances from the optical axis converge at different points.

(B) The effect of the correction plate is to cause all parallel rays to converge at the same focal point, P.

In making the plate it is advantageous to reduce the difference in thickness between the middle and the edge, for it has been seen that the correction element gives rise to two kinds of aberrations: (1) chromatic, due to dispersion, and (2) aberrations due to the angle of incidence of the non-paraxial rays. These aberrations may be reduced by making the absolute value of the deviation as small as possible.

Therefore, the plate must not be used in the form shown schematically in Fig.

paraxial rays, but there is no objection to this.

Figure 4 shows diagrammatically how the correction plate in its ultimate form causes the rays of a parallel beam to converge upon one point after reflection from a hollow mirror. The effect of the correction plate is also seen from Fig. 5, likewise relating to a pencil of parallel rays reflected by a hollow mirror. In Fig. 5 (A) there is spherical aberration; while in Fig. 5 (B) this has been eliminated by the correction plate.

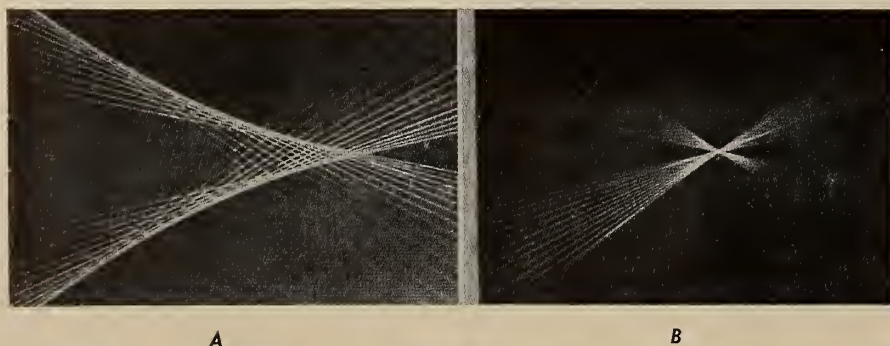


FIG. 5. The influence of a correction plate on the passage of rays reflected from a spherical hollow mirror.

(A) The course followed by the rays without the correction plate. On the left is the hollow mirror reflecting the rays, which are made visible here. (B) The course of the rays when a correction plate is used. Before striking the mirror the rays pass through a correction plate. The rays which in (A) form an extensive caustic curve converge in (B) upon a sharp focal point.

These photographs were taken with a slanting photographic plate in the focus of the mirror system. In both cases the central rays of the beam reflected by the mirror have been blocked out.

Technicolor's 5-Month Sked; 415 Average Print Order

A year or more ago, the lapsed time between the completion of photography and the commencement of delivery of release prints by Technicolor on the average for feature productions ran about 9½ months. In individual cases it ran a year or more. About two years ago Technicolor started an expansion program from 160 million feet per year print manufacturing volume to a goal of 320 million feet a year by the end of 1948. Technicolor already enjoys more than 50% of this increased capacity, but it is printing relatively more than it has been photographing.

Technicolor has improved its print delivery so that by the third quarter of this year it will have reduced the lapsed time between completion of photography of features and the starting of delivery of release prints to 6½ months. Interestingly, when the lapsed time averaged 9½ months, 6½ months of this time was taken by the producer from the completion of photography to the delivery of the cut negative.

Overall 5-Month Schedule in 1949

By the end of 1948 it is expected that Technicolor deliveries will be back to "normal," i.e., 3 months of the time on the average will be required by the producer for delivery of the cut negative to Technicolor, which will require 2 months on the average from the time it receives cut negatives until it begins delivery of release prints. This 2 months is about equally divided: 1 month for the preparation and approval of an "answer print," and 1 month from the time of approval of the answer print of the commencement of delivery of release prints.

In doubling its printing capacity, Technicolor is deliberately attempting, if possible, to keep the lapsed time from completion of photography to commencement of delivery of release prints down to normal. The average number of release prints ordered per Technicolor picture during 1948 so far is 415.

Day Becomes Night via Infra-Red

A strange thing about cinematography is that in order to get that black night effect on the screen, you have to shoot outdoors in a place where there is plenty of bright sunlight and a deep blue sky. You also have to use infra-red film. It is impossible to get the same impressive night effects with standard black and white film, or even with infra-red, if you shoot close in where the daylight skies are pale grey.

Impetus to Increased Locotion Jaunts

This fact, in combination with the increasing consistency of the film's emulsion speed, is serving as a decided impetus to location jaunts, reports the American Society of Cinematographers.

Infra-red requires the elimination of all screen makeup, except the necessary brown lipstick which counteracts the film's characteristic of reducing all red to white. Young players in particular are rated far more photogenic without make-up.



She owes her "ripe old age" to him . . .

HOWEVER skillfully she might play her part, this young actress would still seem more girl than grandmother—save for the creative ingenuity of the make-up man.

By deft application of grease paint and putty, he has added years to her appearance...and conviction to her role.

This is but one instance of the magic at the make-up man's command. He does as much and more for film folk

who must be transformed to Jekyll, Cyrano, gnome, or Manchu.

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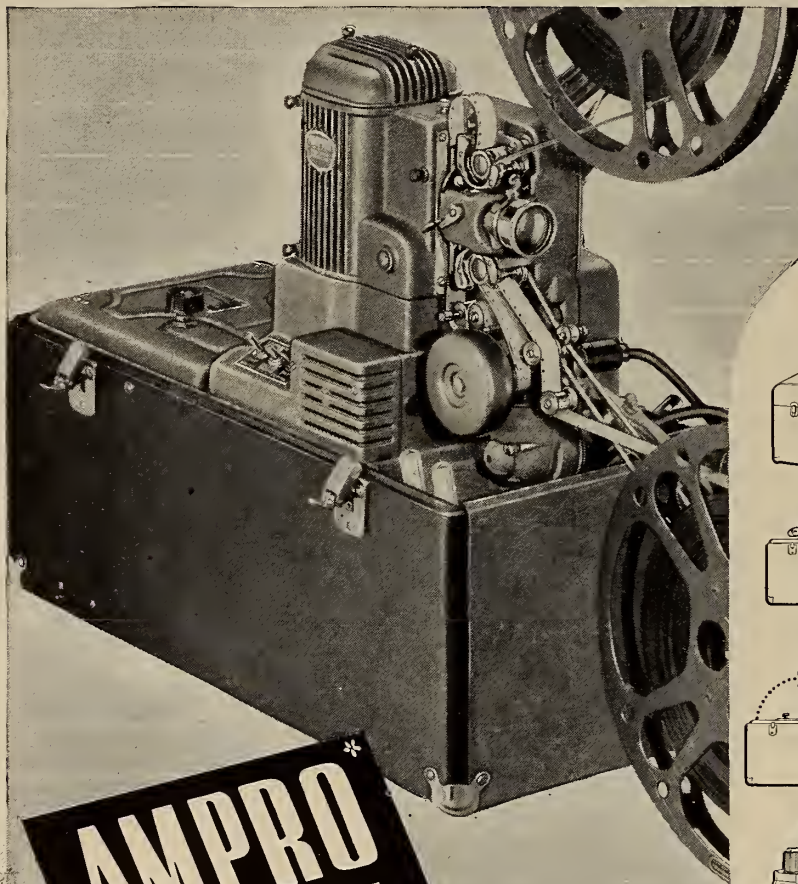
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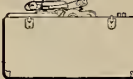
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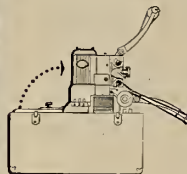
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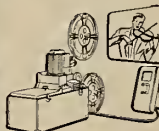
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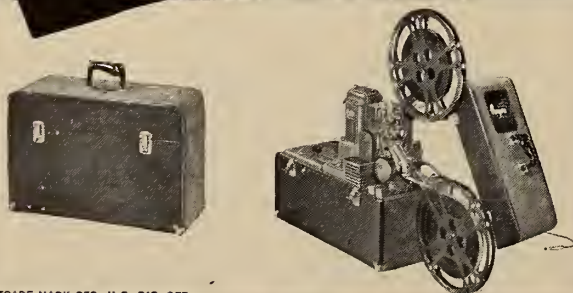


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The 39th Biennial IA Convention

CONTINUING growth numerically and an extension of influence in various segments of the amusement field were reported to the 1097 delegates representing 812 Local Unions at the 39th Biennial Convention of the IA at Municipal Auditorium, Cleveland, August 16-20. Contributing to this organizational well-being was the comparative stabilization achieved in the Hollywood studio situation due to a combination of factors including the jurisdictional agreement reached with the IBEW and the steadfast support of the producers and other unions; the IA's penetration of the television field, and the move now under way to extend the IA's sway in the motion picture field by organizing non-technical (white-collar) workers in the film company home offices.

The Alliance now comprises 940 Local Unions, 29 of which have been chartered since the last convention and including 11 mixed Locals, Tv broadcasting employees in Los Angeles and Philadelphia; wardrobe attendants in St. Louis, Pittsburgh, Kansas City and Dallas; treasurers and ticket sellers in Rochester, N. Y.; studio mechanics in Detroit, and exchange people in Vancouver, B. C.

The only changes in elective office were the naming unopposed of James McNabb, Local 154, Seattle, as delegate to the AFL convention; Oliver M. Lynn, Local 210, Edmonton, Canada, as delegate to the Dominion Trades & Labor Congress, and John H. Wald, Sr., Local 434, Peoria, Ill., as secretary of the 9th District. All other officers were unopposed and therefore were re-elected unanimously.

Few But Important Topics

Old-age pension plans and intensified effort to organize the 16-mm film and the Tv fields constituted the main business of the Convention—apart from an abortive attempt by several studio Locals to impose a boycott on the showing of British-made films in America in retaliation for the establishment of stringent British regulations relative to picture quotas and blocked funds accruing to U. S. films.

One resolution bearing on this situation won approval: the IA President was directed to call upon American producers not to negotiate further with either the British government or film producers until full consideration is given to the employment situation in American studios. Obviously, consideration of such an appeal by the producers is purely elective. In any event, this move is a far cry from a boycott.

Present status of the American-British impasse on motion picture matters is reflected by a plan, outlined at Cleveland, to form an international council representative of British-American governments, producers and labor unions which will attempt to iron out the more pressing angles of the situation.

A somewhat similar reciprocal deal with Mexico, providing for the unhampered exchange of production workers, was ruled out by President Richard F. Walsh of the IA on the ground that the time was not ripe for such a move.

Favor Pensions at Local Level

The establishment and administration of an old-age pension plan on a national scale was effectively disposed of by a report of the IA General Executive Board which stated that considerations of Local Union autonomy (it being very evident that the Convention overwhelmingly favored retention of this right); staggering first cost (\$30,000 being the estimate for even a preliminary survey), and the fact that at least five years would be required for the accumulation of funds before any payments could be made—these factors militated against the establishment at this time of a national pension plan.

Employer-participating pension plans, to be administered jointly by employers and the Locals, were approved by the Board, which pledged the cooperation of the General Office in effecting such a plan for any Local requesting assistance. Over-all, the Board promised to reconsider a national pension setup when the number of such plans negotiated at the local level augured well for its ultimate success.

** Excerpt from "In the Spotlight," by Harry Sherman, in IP for May 1948, p. 18:*

"While well aware of the tremendous expansion of 16-mm activity, as recounted in this department from time to time, we were hardly prepared for the mass of information supplied by a prominent 16-mm equipment manufacturer during a recent discussion in this office. This manufacturer, an old friend of ours and a good friend of the organized craft, covered the 16-mm field in terms of itinerant exhibitors, which have increased enormously in the past year, particularly in Canada and in the southern part of this country; of educational and industrial showings, and of the growing tendency to spot 16-mm units in the smaller theatres.

"Warning signals to the end that the craft be on its toes in connection with 16-mm developments have appeared herein frequently; but our manufacturer friend gave as his opinion that craft efforts to date in this direction, no matter of what dimension,

Characterizing IA efforts in the 16-mm field as something less than wholly successful, largely because of the thousands of men trained for this work by the armed forces, President Walsh opined that this was primarily a job for the Local Unions, each in its own territory. He added that top-notch competency was a prime requisite, and that while 16-mm sponsors might be willing to give the work to the IA, they were loathe to employ men who, through unfamiliarity with the equipment, functioned as mere stand-bys while the sponsors put on the show. As an aid to IA progress in the sub-standard field, President Walsh advocated special training within Local Unions for a group of men who would specialize in such work.

[NOTE: IP has for many years advocated just such a program as was recommended by President Walsh, as is apparent from the appended reference to a recent statement on this topic.*—Ed.]

Tv Setup a Tough Assignment

The General Office has received a few inquiries from Locals regarding separate charters for 16-mm work, the IA head revealed, but the IA officials feel that such special setups would weaken the claim of the IA to jurisdiction over all projection. Local Unions may grant special 16-mm projectionist memberships and confine those men to such work, the Convention was reminded. President Walsh thought it advisable that Locals consider separate wage scales for 16-mm work as a means of competing with non-union projectionists.

The organizing of television workers presents many difficulties, reported

fall far short of what is needed to guarantee continuing craft dominance and security in this field.

"Although many of the larger Locals have organized special 16-mm groups for the training of their members, with these men being given the preference on all 16-mm calls, it seems to us hardly enough to confine such activities to the urban centers. The craft must be prepared as a whole so that sponsors of 16-mm showings will automatically turn to IA men for such work, regardless of locale. This means that even the smaller Locals will have to be assured of at least one man, and preferably more, who can handle efficiently any 16-mm showing, on any type of equipment.

"This program will require a bit of doing and probably a bit of sacrifice of time, money and effort on the part of the smaller Locals, but if eternal vigilance be the price of security, that price will have to be paid.

"Remember: not tomorrow, or next week, or next month, or next Fall, but NOW."

Walsh, who cited the following impedimenta thereto: (1) Tv workers definitely come under the Taft-Hartley law, thus it is extremely difficult to obtain an employer's signature to a contract for the first time until a collective bargaining election has been held. This feature of the T-H law is naturally exploited to the hilt by the employer;

(2) Not a few employees of Tv stations are carryovers from radio stations and are subject to existing contracts of long standing;

(3) Many employees are recruited from engineering schools, and the newly-born Bachelor of Science, probably on his first job, is not union-minded—an outlook carefully nurtured by the broadcast people who do the hiring; and

(4) Jurisdictional tangles. The IA has not only its long-standing foe, the IBEW, to contend with, but also must vie for Tv jobs with the National Assoc. of Broadcast Engineers and Technicians (independent union), and the American Communications Assoc. (CIO).

A case in point concerns Station WPIX, the *Daily News* Tv outlet in N. Y. City, where, although the IA has men in the studio, the IBEW has applied to the National Labor Relations Board for an election to determine which union will be the bargaining agent and also which jobs will be included therein. On a larger scale, President revealed that he has been meeting with President Dan Tracy of the IBEW through the past year in an effort to negotiate a national Tv jurisdictional agreement similar to that effected for the Hollywood studios. So much progress has been made to this end that it was hoped to have a signed agreement ready for presentation at Cleveland, but the ironing out of the many ramifications of such a pact barred realization of this hope.

As far as theatre structures are concerned, said the IA leader, the Alliance claims sole and complete jurisdiction within all four walls and will concede nothing to anybody; this despite the fact that an injunction granted to the American Broadcasting Co., through the NLRB under the T-H law, forced the IA to permit its members to work with non-union men at the premiere howling of ABC Tv at the Palace Theatre in N. Y. City.

IA's Strong Financial Position

The IA is in fine shape financially by reason of having a total of \$833,602.44, broken down as follows: \$437,278.57 in actual cash balances, \$137,018.26 in negotiable securities at cost, "other assets" of \$27,747.43, and \$231,558.18 in the Transportation & Per Diem Fund.

The Convention approved a resolution granting an increase of 15% increase in both salaries and hotel ex-

penses for all elected and appointed officials of the IA.

Noteworthy among the many addresses made by prominent people before the Convention was that of President William F. Green of the AFL, who in an impassioned speech blasted the T-H law and exhorted the delegates to get behind Labor's League for Political Education and garner every vote possible to defeat T-H law proponents at the coming national election.

Edward Arnold, appearing on behalf of the Screen Actors Guild, said that the several misunderstandings between the A and the actors during the past several years have all been cleared up and that the Alliance now rates very high with all Hollywood unions.

Tom O'Brien, general secretary of NATKE, British film workers' trade union, and an honored guest at the Convention, delivered a splendid talk in which he pleaded for mutual understanding between the American and British film industries, cited the dire economic plight of Britain as the reason for legislation which is considered inimical to American interests, and expressed the hope that matters would take a turn for the better and enable very close cooperation between the respective film interests, and particularly between his union and the IA.

Subsequently O'Brien was given a gold card signifying honorary life membership in the IA.

Although no legal determination of the status of the IA as whole under the T-H law has been made, President Walsh expressed the belief that sound servicemen, Tv crews and exchange workers definitely are covered by the act. No move has yet been made to determine that status of workers in the exhibition

and the studio fields, and neither the IA nor the employers give any evidence of seeking clarification of this matter as long as things run along smoothly.

Improved Hollywood Situation

Highlight of President Walsh's oral report on what he termed "the second part of the serial on the Hollywood studio situation" was the revelation that the IA came perilously close first to suspension and second to withdrawal from the AFL at the 1947 convention of that body in San Francisco. The IA leader's dogged resistance to a "clarification" (and a subsequent "interpretation" of same) of an original Executive Council decision relating to jurisdictional rights in the studios as between IA and the Carpenters Union was the basis for the trouble.

The fact that the IA remained in the Federation was attributed by President Walsh to the success attendant upon much behind-the-scenes spade work by the IA and other friendly delegations in putting across the IA's side of the story. The IA leader expressed particular pleasure anent the fact that IA prestige in labor circles has grown enormously within the past five years, thus enabling it to stand up firmly for its rights against even the most powerful units in the AFL.

That the IA is by no means out of the woods insofar as the Hollywood studio situation is concerned was stressed by President Walsh who pointed out that the jurisdictional tangle within the AFL still is very much alive; the IA is a party to a Congressional investigating committee the report of which still has not been released; token picket lines of opposing unions still are maintained at the studios; several important cases are pending before the NLRB, and the IA still has legal suits totalling \$73 millions on its hands.

"The Hollywood studios are running along, however," concluded the Alliance leader, "and our people are doing the work. We are now on top in the Hollywood studios and we intend to stay there. Maybe at the next convention you will get the third serial of Hollywood."

All in all, the 39th Convention was marked by complete harmony within the IA and was indicative of a tighter unity among the many and varied crafts that work at the diverse jobs in the amusement industry. The meeting served to enhance considerably the prestige of the IA both within and without the industry, and its public relations have never been better.

Needless to say, the Cleveland host Locals who handled the strenuous tasks of organization and arrangements for the convention did a magnificent job and richly deserved the praise heaped upon them.



IA President Richard F. Walsh

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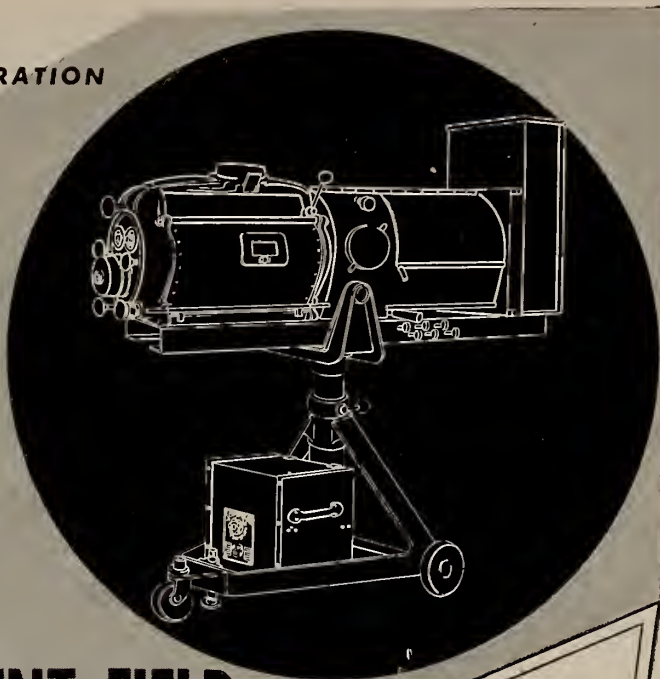
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IN PREVIOUS installments we discussed (1) the necessity for scanning both the camera tube and the picture tube (2) the essential requirement that these operations be synchronized, and (3) the devices which make it possible to control the motion of the electron beam in these tubes. We shall now describe the details of the path of the scanning beam on the tube screen, the wave-shapes necessary to produce this path, and some of the problems incident to the scanning operation.

As already mentioned, the usual scan is from left to right and from top to bottom. In certain cases this order must be reversed, but the principle is the same.

Figure 12 shows a simplified diagram of a scanning pattern: this is often called a "raster." The rectangular diagram formed by the light lines connecting points *A*, *B*, *C* and *D* represents what we may call the "picture space." The width of this rectangle (*AB*) is drawn so as to be 4/3 times the height (*AC*); this is the same proportion used in motion pictures. The ratio of width to height is called the "picture aspect ratio" and its value of 4/3 is one of the F.C.C. Tv standards.

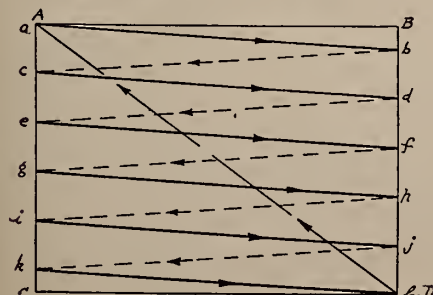
On a picture tube the heavy lines *ab*, *cd*, etc., are caused by the fluorescent glow which occurs as the electron beam moves from point *a* to point *b* (in the direction of the arrow on line *ab*).

Scanning Operation Data

Note that points *a* and *A* coincide, while point *b* is slightly below point *B*. All the lines in Fig. 12 slant downward which is necessary so as to provide the vertical (top-to-bottom) part of the scanning process. In fact, the left-to-right component of scanning is called "horizontal scanning" or "line scanning"; the top-to-bottom component is called "vertical scanning" (also called "frame scanning" or "field scanning," for reasons which will be made clear later on).

This slant-line system of scanning is used because the characteristics of the electric circuits which provide scanning make it impossible to scan in a series of truly horizontal lines, with an extremely

FIG. 12. A simple progressive scanning pattern in which the picture is scanned in a series of lines which start at the upper left and slope down to the right.



TELEVISION: How it Works

By WILLIAM BOUIE

The third in a series of articles on television image propagation and reception, as based on a chapter in a book by the same name published recently by the John F. Rider organization.

vertical drop at the end of each line.

After the beam reaches point *b* it is deflected back along the dotted line *bc* to start a new line, *cd*. On the picture tube the line *bc* would be much fainter than line *ab* because the time allowed for the beam to move from *b* to *c* is only about 1/10th the time allowed for it to travel from *a* to *b*. Lines like *ab*, *cd*, etc., are called "line traces"; lines like *bc*, *de*, etc., are called "line retraces" or "line flybacks."

Here some questions may arise: Why does the motion of the spot across the screen appear as a line? Why is the flyback dimmer than the trace?

Motion Picture Analogy

The eye is responsible for these effects. Anyone who has ever swung a flashlight or a "sparkler" in a circle must have noticed that as the speed of the swinging is increased the individual spot of light merges into an apparently continuous circle of light. The velocity of the scanning spot across the picture tube is so rapid (several thousand miles per hour) that the eye cannot distinguish the spot from a continuous streak ("persistence of vision").

The difference in brilliance between the trace and the flyback is due to the fact that the brilliance of the fluorescence produced on the picture-tube depends on the time during which the electron beam acts upon it. Although in both cases the actual time is very short, the difference in time (about 10 to 1) does result in a very marked difference in brilliance.

A complete set of lines such as shown in Fig. 12 is called a "frame." This particular frame is completed when the spot reaches point *l*; it then returns to point *a* to start a new frame. This frame

is said to be built up by "progressive scanning" (the lines follow each other in a continuous chain).

Six complete lines (retraces are not counted) are shown in Fig. 12, a complete technical description of which would be: "A six-line frame (or raster) produced by progressive linear scanning."

Of course, so few lines as we have shown would be insufficient to give a good picture, and a very great many more are actually used. In order to give the eye the illusion of motion, many complete frames must be traced out every second. Standard American procedure is to trace 30 complete frames every second, each frame consisting of 525 lines.

Flicker, Hum on the Raster

It has been found that if the raster is bright, a flicker will be observed when the number of frames per second (frame frequency) is less than a certain critical value. Although a satisfactory illusion of motion might be produced by about 12 frames per second, as many as 48 frames per second may be required to remove objectionable flicker.

The more frames per second a Tv transmitter sends out, each having a large number of lines, the higher the modulation band-width required. One way to keep the band-width down is to send twice as many frames per second, each frame having half the number of lines.

But a large number of lines is necessary for detail in the picture. It was therefore decided to divide the total number of lines in each frame between two rasters (called "fields"), each containing half the total number of lines required to make up a frame. These fields, transmitted at the rate of 60 per second, get rid of the flicker effect.

The required number of lines per frame is supplied by sending the odd-numbered lines along with one field, and the even-numbered lines along with the following field. The fields are transmitted so rapidly that, as far as the eye can see, all the necessary lines appear in their proper positions on the raster simultaneously.

The method of scanning just described is called "interlaced scanning" and is the system now in use. A simplified pattern of a frame produced by interlaced scanning is shown in Fig. 13. The general principles are the same as for progressive scanning—in fact, each field is itself progressively scanned.

'Odd-Line' Interlaced Scanning

The lines transmitted during the first field scan (Fig. 13) are lines 1, 3 and 5 and the first half of line 7. The beam is then deflected to the top of the picture

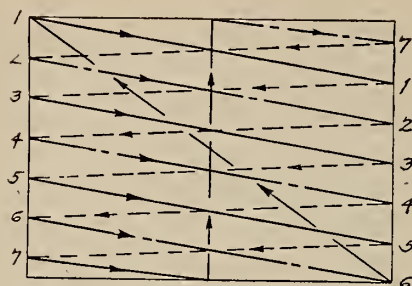


FIG. 13. An interlaced scanning pattern in which the odd and even lines are scanned on successive fields.

space to begin the second field. During the second field, line 7 is completed and lines 2, 4, and 6 are traced, thus completing the entire 7-line frame in two steps. (As in Fig. 12, the arrows show the direction of travel of the beam spot.)

The use of an odd number of lines has been found advantageous in interlaced scanning; this method is called "odd-line interlacing." American practice calls for 262.5 lines in each field, making 525 total lines per frame. Sixty fields are transmitted each second, giving a field frequency of 60 per second.

The frame frequency chosen depends upon the a-c power-line frequency: it must be an even multiple or sub-multiple thereof. The reason for this is that if there is some hum present in the deflecting circuits, a certain amount of distortion will appear in the picture. If this distortion appears to be stationary and is not excessive, it can probably be tolerated. On the other hand, if the distortion moves so that the picture appears to have moving ripples in it, even slight distortion is most objectionable.

The Scanning Wave-Form

By making the frame frequency an even sub-multiple of the power-line frequency, this type of hum pattern can be rendered stationary. Since most American power lines use 60-cycle a-c, the frame frequency chosen was 30 per second. (In England, with 50-cycle a-c, the frame frequency is 25).

In describing the picture tube, we showed that the beam can be deflected by applying suitable potentials to the

deflecting plates or suitable currents through the deflecting coils. The nature of these voltages and currents depend upon the kind of deflection to be produced.

In Fig. 13 is shown the kind of deflection required in Tv scanning. The trace deflection required is a steady motion from left to right along a line slanting slightly downward to the right; the retrace travels from right to left along a line slanting downward to the left. Such a motion will occur when both sets of deflecting plates or coils are in operation simultaneously. Thus, in scanning, two deflection circuits are acting at once, one moving the beam horizontally (horizontal deflection circuit), the other moving it vertically (vertical deflection circuit).

The shape of the voltage (or current) wave which has to be applied to the deflecting plates (or coils) to produce the desired scan is shown in Fig. 14. At the left is shown the wave-form for horizontal or line scanning; at the right the wave-form for vertical or field scanning.

Notice that the time of the line-wave is equal to the time of the field-wave divided by the number of lines per field ($1/60$ th second divided by 262.5 = $1/15,750$ second). Also notice that the line-retrace is allowed only about $1/6$ th the time allowed to the line-trace; the field-retrace is allowed $1/13$ the time of the field-trace.

The total time intervals allowed for these waves indicate that the line-scan frequency is 15,750 cycles, and the field-scan frequency is 60 cycles. These wave-forms are called saw-tooth waves.

Over-all View of Tv System

We can now obtain a bird's-eye view of a complete Tv system. Such a step is advisable at this time because of the complexity of the system and the desirability of not losing sight of the function of the principal parts in the maze of detail associated with all the individual elements.

Figure 15 shows the general role played by each of the major units of a Tv system in causing the picture of the televised scene to appear on the screen

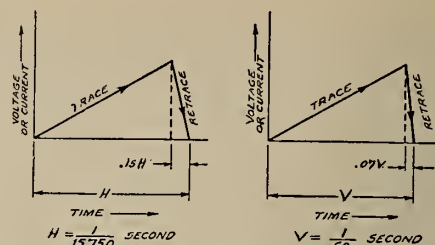


FIG. 14. At the left is shown the saw-tooth waveform required for horizontal scanning. A similar waveform, but of much lower frequency, is required for vertical deflection and is shown on the right.

of the picture tube. You will note that the camera tube is focused on the scene to be televised with the result that an image of the scene is formed on the photoelectric mosaic of the camera tube. In this way each point of the mosaic takes on a voltage which is proportional to the light value associated with this point of the image.

24/30 f.p.s. Compensation

In order to transmit this information, the electron beam of the camera tube completely scans the image on the photoelectric surface 30 times each second. As a result of this the video portion of the Tv signal is produced in which the electrical variations correspond with the light variations on the screen of the camera tube.

In order to fulfill the requirements of synchronization, the need for which has already been explained, a synchronizing signal (abbreviated "sync") is applied to the camera tube deflecting circuits so that the scanning of the electron beam is at all times under the timing control of this sync signal.

Composition of Complete Signal

At the same time this sync signal must also form a part of the Tv signal which is broadcast in order that the scanning at the picture tube in the receiver can be kept in synchronism (in step) with the scanning at the camera tube. For this reason the sync circuit also feeds the same sync signal to the video amplifier, and as a result the complete signal contains information not only on the light values but also the necessary control signals to synchronize the scanning at

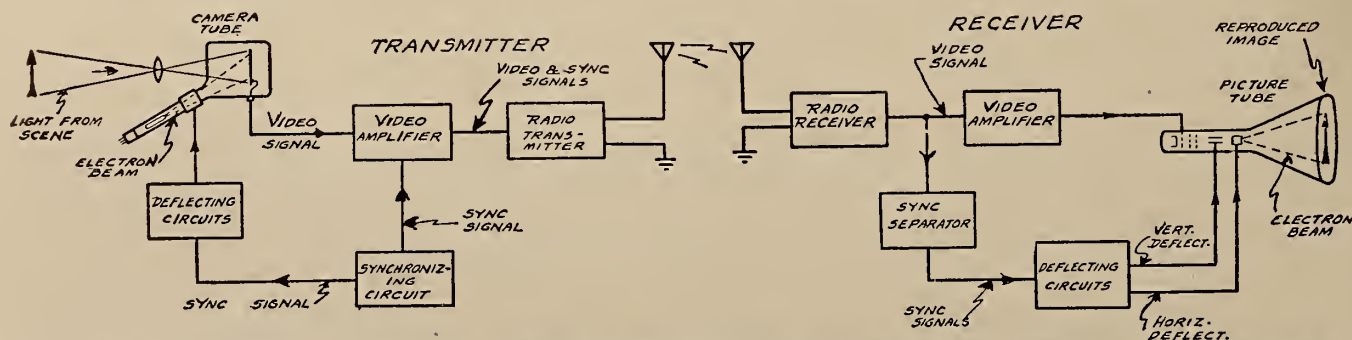


FIG. 15. The principal elements of a complete TV system. Note the provision made for synchronizing the scanning at the picture tube with that at the camera tube.

the picture tube with that at the camera tube.

The complete Tv signal is amplified by the video amplifier circuits in the transmitter and fed to the modulating circuits of the transmitter where it modulates the high-frequency radio wave which serves as the carrier. According to the present frequency allocations, the carrier frequencies used lie within the range between 44 and 88, and between 174 and 216 megacycles. The reasons for the use of carrier frequencies in the ultra-high frequency range and the actual make-up of the signal will be discussed later in detail.

The signal radiated by the transmitting antenna is picked up by the receiving antenna and fed to the Tv receiver. The signal is amplified in this receiver, which is almost invariably of the superheterodyne type. After sufficient amplification the signal is demodulated in the second detector of the receiver and the video and sync signals are recovered.

The video amplifier following the detector further amplifies the signal, which is finally impressed upon the control grid of the picture tube. The fluctuations of the voltage on the control grid of the picture tube cause the intensity, or brightness, of the scanning spot to vary in accordance with the amount of light on that element in the scene which at that particular instant is being scanned by the electron beam of the camera tube.

The receiver contains separate circuits for deflecting the beam of electrons horizontally and vertically so as to accomplish the scanning of the image at the picture tube. In general, these circuits are similar to those used to deflect the electron beam at the camera tube.

To insure absolute synchronization between the scanning at the picture tube and that at the camera tube, the receiver contains circuits (called "sync separator" circuits) for separating the synchronizing pulses from the complete Tv signal. As noted in Fig. 15, these impulses are applied to the deflection circuits in the receiver and keep the two scanning beams—the one in the camera tube at the transmitting end, the other in the picture tube at the receiving end—in perfect synchronism. In this way the image of the scene is traced out by the moving spot of light on the screen of the picture tube.

In the foregoing description we have omitted a consideration of the sound broadcasting which almost invariably is a part of the Tv broadcast. For the present, it will suffice to understand that the sound is transmitted and received in the same way as a conventional sound broadcast, even to the extent that an entirely separate carrier is used to carry the modulation of the sound accompanying the Tv broadcast.

[To be Continued]

The Transistor: Amplifier-Oscillator May Supplant Vacuum Tube

WHAT may prove to be one of the most important electronic developments in recent years was demonstrated recently by Bell Telephone Laboratories with the introduction of a new crystal device designed to perform efficiently nearly all the functions of the vacuum tube, but without any of the structural or operating limitations of the latter.

Known as the Transistor, the device works on an entirely new physical principle discovered in the course of fundamental research into the electrical properties of solids. Although it still is in the laboratory stage, the device is expected to have far-reaching significance in electronics and electrical communication.

Two hair-thin wires touching a pin-head of a solid semi-conductive material soldered to a metal base are the principal parts of the Transistor. These are enclosed in a simple metal cylinder not much larger than a shoelace tip. It has no vacuum, no glass envelope, no grid, no plate, no cathode and therefore no warmup delay. It will serve as an amplifier or an oscillator—yet it bears almost no resemblance to the vacuum tube now used to do these basic jobs. More than a hundred Transistors can easily be held in the palm of the hand.

Since the device still is in the experimental stage, no data on cost are available. Its essential simplicity, however, indicates the possibility of widespread use, with resultant mass-production economies. When fully developed, the Transistor is also expected to find new applications in electronics where vacuum tubes have not proved wholly suitable.

Current Passage in Transistor

Tests have shown that the Transistor will amplify at least 20 decibels (100 times). Some test models have been operated as amplifiers at frequencies up

to 10 million cycles per second. Because of the basically simple structure of these new units, stability and long life are expected.

Transistor action depends upon the fact that electrons in a semi-conductor can carry current in two distinctly differ-

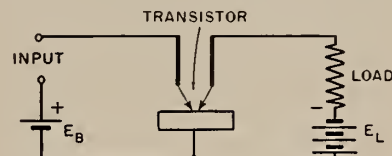


FIG. 2. The Transistor circuit.

ent ways. This is because most of the electrons in a semi-conductor do not contribute to carrying the current at all. Instead they are held in fixed positions and bind the atoms together in a solid.

Only if one of these electrons gets out of place, or if another electron is introduced in one of a number of ways, can current be carried. If, on the other hand, one of the electrons normally present is removed, then the "hole" left behind it can move like a bubble in a liquid and carry current!

As shown in the circuit sketch (Fig. 2) two "catwhiskers" are applied to a small block or flake of, say, a germanium alloy. These contacts touch the crystal at points about 0.002 inch apart. The input circuit is applied to one contactor with a bias of about one volt (positive). The input impedance of the transistor is low—100 to 1000 ohms. The output circuit is similar except that it is fed with a low-voltage source of power (30-40 volts) with the positive grounded.

In effect, the presence of the input contact wire carrying the input signal may be said to inhibit the effectiveness of the load circuit. A substantial amount of voltage gain is produced thereby in

(Continued on page 32)

FIGURE 1

Contained in a small metal cylinder, the Transistor consists of two extremely fine wires whose points rest on a small square of a semi-conductor.



IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

PLAYING a four-day stand at the Municipal Auditorium in Cleveland, Ohio, the 39th Biennial IA Convention closed its sessions after one of the most successful meetings in the history of the Alliance. A rap of the gavel by "Honest John" Fitzgerald, president of Cleveland Local 27 and an International representative, was the signal for the opening of the proceedings. Harland Holmden, IA first vice-president and business manager of Cleveland Local 160, ably presided as temporary chairman, introducing the speakers. The list of speakers included many prominent political and labor leaders of high standing. The IA has travelled far in the past years in building the prestige of the organization and has earned the respect and good-will of the entire industry. (A detailed report of the Convention proceedings will be found on page 13 of this issue.)

Personalities at the Convention

- Victor A. Welman, secretary of Cleveland Local 160, was one of the busiest men at the Convention. We had a hard time catching up with him for he was constantly on the move oiling the machinery that made everything run so smoothly. Too much praise cannot be given the officials of all the Cleveland Locals for the really swell job they did in looking after the welfare of the delegates and their families. No effort was spared in providing entertainment for the visitors—everything from tickets to

the major league baseball games, passes for all the movies in town, sightseeing trips, *etc.*, to luncheons and fashion shows for the ladies was made available.

A suite of beautifully appointed rooms at the Hollenden Hotel was set aside as special headquarters for the lady visitors. Plenty of refreshments and music made this spot a popular rendezvous for the fair sex. Occasionally a male moocher (yours truly was one of them) would barge in under the pretext of looking for his lady but he did not linger too long, for few could brave the glares directed at them for trespassing in this "no man's land." Perry Carter and Jim Sauter, members of Cleveland Local 160, were in charge of this haven, and their tact and graciousness helped immeasurably in its popularity.

- In our opinion the best-dressed and best-looking delegates were Fred Raoul (son of IA secretary-treasurer Wm. P. Raoul), Local 225, Atlanta, Ga., and Dick Hennley, Local 165, Hollywood, Calif. They certainly copped all sartorial honors.

- We were happy to see our old friend, Clyde Weston, delegate from Local 147, East St. Louis, Ill. Clyde still retains his youthful slimness, much to the despair of many of us who have grown somewhat paunchy with the years.

- Although perennially youthful Eddie Miller, IA representative and business

agent for Local 279, was faced with the prospect of resuming contract negotiations upon his return to Houston, it did not deter him from digging into Convention business with his usual energy.

- Those two grand guys, Lou Clendenning and Gus Hilton, president and business agent, respectively, of Local 310, Atlantic City, N. J., represent teamwork at its best. The harmonious relationship that has existed between these two officials for many years is reflected in the smooth functioning of Local 310 affairs. Incidentally, Lou deserted the joys (?) of single-blessedness several months ago, and despite the fact that he always manages to locate accommodations for visitors to his famous city, he and his bride have been unable to find living quarters for themselves. Tough predicament to be in.

- It has become customary at IA Conventions for the two largest projectionist locals, New York Local 306 and Chicago Local 110, to party each other. The Chicago delegates hosted the New York delegation at a luncheon in the Theatrical Grill, a popular eating place in Cleveland. In addition to the Local 306 delegates who appeared at the luncheon, the invited guests included Herb Griffin, International Projector Corp.; Charlie Hahn, McAuley Mfg. Co.; Merle Chamberlin, M-G-M Studios, Culver City, Calif.; Bill Finegan, Cleveland Local 27;

WELL-KNOWN PROJECTION AND LABOR PERSONALITIES SEEN AT THE RECENT 39TH BIENNIAL CONVENTION IN CLEVELAND



Left to right: Victor A. Welman, secretary, Local 160, Cleveland, Ohio; Eddie Miller, business agent, Local 279, Houston, Tex., and IA representative; Harry Barca, business agent, Local 143, St. Louis, Mo.; Merle Chamberlin, chief projectionist, M-G-M Studios, Culver City, Calif.; Glenn Kalkhaff, president, Local 164, Milwaukee, Wis.; Jake Pries, business agent, Local 225, Atlanta, Ga.; Herman Gelber, president, Local 306, N. Y. C.

Otto Trampe, Glenn Kalkhoff and Walter Behr, Local 164, Milwaukee, Wis.; Walter Haesley, Local 416, Rochester, Minn.; John Kuntsman, Local 655, Sheboygan, Wis., and Larry Dauplaise, Local 457, Superior, Wis.

Also at the luncheon were the following members of Local 110: Neal Bishop, Jack Wolfberg, Jack Behlke, Harold Huchberger, Art Weigman, Claude Holmes, Louis Malisoff and George Clark. Joe Abrams, member of New York Local 306, who was a visitor at the Convention, also was present.



Among the visitors at the 40th Anniversary party of Los Angeles Local 150 held at the Chose Hotel, Sonto Monico, Calif., on August 3 last: (left to right) Bill Bennett, bus. rep., Local 22, Woshington, D. C.; George Schoffer, bus. rep., Local 150; Jim Eddy, bus. rep., Local 165, Hollywood, Calif.; Carl Cooper, IA 7th vice-pres.; Alonzo Bennett sec., Local 521, Long Beach, Calif., and Ralph Adams, bus. rep., Local 504, Sonto Ano, Calif.

- The beautiful dramatic soprano voice of Lenore Pernick, 17-year old daughter of New York Local No. 1's business agent, Solly Pernick, thrilled the delegates at the opening session with her rendition of the national anthem. We predict that the Pernick filly will make her mark in the music world in the not too distant future.

- John Wald, business agent of Local 434, Peoria, Ill., won a hotly contested election for the office of secretary for the 9th District. Roy Brewer, former District secretary, resigned in order to devote more time to his increasingly heavy duties on the West Coast.

- We kept running into Jake Pries, business agent for Atlanta Local 225. Jake prides himself on the fact that he was an ERPI man back in 1927 and that he can hold his own on projection matters with anybody in the business.

- One of the delegates (we promised not to divulge his name) lost his lower denture somewhere between the Hollenden and Allerton hotels. The last we heard of this mishap was that he was chasing back and forth between the two hotels tracing down the many clues gratuitously given him by his fellow-delegates. We

hope he found his choppers before he left for home.

- Elbert (Eddie) J. Brock, Cleveland Local 160, gave an excellent account of himself behind the refreshment bar at the Cleveland headquarters. He dispensed the liquids with the skill of a professional (bartenders union, please note). The popularity of this particular spot was due not only to Eddie's artistry in filling 'em up, but also to the piano entertainment furnished by Mabel Curtis, well-known stage star and wife of Percy Miller, delegate from Louisville Local 163. A mixed chorus, not always on key but with lusty voices, supplied the vocal accompaniment. A favorite gathering-place for the conventioners.

- In the opening address to the delegates, William F. Green, president of the A F of L, made one of the fieriest

speeches we ever heard him deliver. He was bitter in his denunciation of the sponsors of the Taft-Hartley Law, and strongly urged his listeners to defeat this anti-labor measure at the coming elections.

- President Walsh was the guest of honor at a shindig sponsored by TT Local 751, New York City. This is the first time since the treasurers and ticket-takers were admitted to the Alliance, some 12 years ago, that an IA president appeared at one of their parties.

- We were quite surprised to learn that Sam Zoldak, pitcher for the Cleveland Indian ball team, who, incidentally, pitched a shut out game in Cleveland against the St. Louis Browns during Convention week, is a member of Local 366, Westchester County, N. Y. Zoldak

(Continued on page 30)

ANOTHER GROUP OF IA STALWARTS WHO WERE VERY MUCH IN EVIDENCE AT THE RECENT CLEVELAND CONVENTION



Left to right: Wm. P. Covert, business agent, Local 173, Toronto, Can., and 2nd IA vice-president; Al Johnstone, president, Local 293, New Orleans, La., and IA representative; Sam Bononsingo, business agent, Local 138, Springfield, Ill.; J. A. Shuff, business agent, Local 364, Akron, Ohio; Orin Jacobson, Local 175, Tocomo, Wosh., IA representative; Gene Atkinson, business monogor, Local 110, Chicago, Ill., and D. MacKenzie, Local 302, Colgory, Can.

Wavelengths and Frequencies

By R. HOWARD CRICKS

Editor, Technical Section, "Ideal Kinema" (London, England)†

STROLLING in my garden the other evening I watched three bats wheeling about and enjoying life. Memory told me that as a boy I should have heard their shrill cries; but all that I heard was an occasional faint squeak as one passed near me (this shrill squeak is, in fact, the bat's "radar," by which it avoids bumping into obstacles in the dark).

This thought set me pondering upon the enormous range of frequencies that exist in the world and the very small proportion of them to which our senses are directly sensitive. A bat's cry is round about 20,000 c/s, and it was no doubt only its bass notes that I was able to hear; yet there is little doubt that many animals can distinguish higher frequencies (a proof of this is the inaudible dog whistle, which generates a sound too high for human ears to hear, but audible to a dog). It seems reasonable to suppose that as we go down the scale of life to the insects, they should be sensitive to even higher frequencies, which may well provide the means of communication which undoubtedly exists.

The Recognizable Range

And yet the possible range of sounds, audible and inaudible, is only a small fraction of the range of frequencies which are known to exist, notably in the range of the so-called electro-magnetic waves, which include radio, heat and light, and beyond these, X-rays and cosmic rays.

It is quite impossible to convey any real idea of the vast range of frequencies that have been detected. My sketch (Fig. 1) has been prepared to extend only to the two frequency bands to which the ear and the eye are sensitive. This figure is logarithmic; if instead it were made arithmetical—if 90 cycles at the right-

hand end took up the same space as 90 cycles at the left-hand end—the chart would stretch 80 times from the earth to the sun and back again!

Let us consider the various sections of this chart; but let us first go beyond the chart to consider what "zero cycles" means. Being logarithmic, the chart can never show zero frequency, but the term simply means that the frequency gets gradually lower and lower until eventually there is no change at all. This actually corresponds to a direct current and therefore one occasionally sees d-c referred to as 0 c/s.

The Point Where Music Begins

Coming into the chart there is some ill-defined point between the first two divisions where an intermittent noise becomes a continuous note. The longest pipe of an organ is more of a vibration than a note; dependent upon the waveform, a vibration becomes a sound at some point between 30 and 40 c/s. This is evidenced by the fact that the familiar 50-cycle mains hum is quite definitely a note (although it must not be forgotten that generally a mains hum contains as much 100 c/s as 50).

Within the range between 40 or 50 c/s and at the most 10,000 c/s (10 kc), lies the whole scope of reproduced sound. The fundamental speech tones lie in the region from 200 to 500 c/s, the consonantal sounds extending up to about 4 to 5 kc. Musical instruments extend up to about 7 kc as regards the fundamentals; beyond that are the harmonics extending far beyond the limit of hearing.

Within this range the ear is an amazingly sensitive instrument. It has been stated that the amplitude of vibration of a faint sound in the higher frequencies is of the order of a wavelength of light, or about 1/25,000th part of an inch.

There is little doubt that the lower animals and insects can hear sounds far beyond the capability of our ears; but a point is reached where, due to the mass and "stickiness" or viscosity of air, the amplitude would be too small to detect.

Etheric Vibrations Propagation

Beyond this range of frequencies, vibrations have therefore to take place in some medium other than air—the mysterious medium which 19th-century scientists christened the ether, but whose very existence seems today the chief of our unsettled scientific problems. Most important of these vibrations is that of light.

Modern research suggests that light consists actually not of vibrations but of particles of matter moving at an enormous speed. The fact that a moving particle such as an electron can produce a wave was demonstrated years before the discovery of the electron, by a French physicist, de Broglie. Since an essential of his theory is that there is no such thing as ether, we are left with this problem: in what medium does the wave occur? The answer is, I gather, that it is not really a wave, but only something with all the properties of a wave—an explanation which still leaves something to the imagination.

Presumably, the same theory applies also to radio waves, which are the lowest of the electro-magnetic spectrum.

Peak-to-Peak Distances

Let us diverge for a moment to consider the relation between frequency and wavelength. In any medium waves have a fixed rate of movement; in air it is about 1,100 feet per second, and in the hypothetical ether around 300,000,000 metres or 186,000 miles per second. The wavelength is specified as the distance between the peaks of waves; from the analogy of sea waves one can see that the longer a wave, the lower will be the rate at which its peaks pass a given point—in other words, the lower its frequency.

We can relate wavelength to frequency by stating that *wavelength multiplied by frequency is equal to the rate of travel of the wave.*

Wavelength Calculations

Therefore, to calculate the wavelength or frequency of a wave, we divide whichever we are given into 1,100 in the case of sound, or 300,000,000 in the case of

(Continued on page 29)

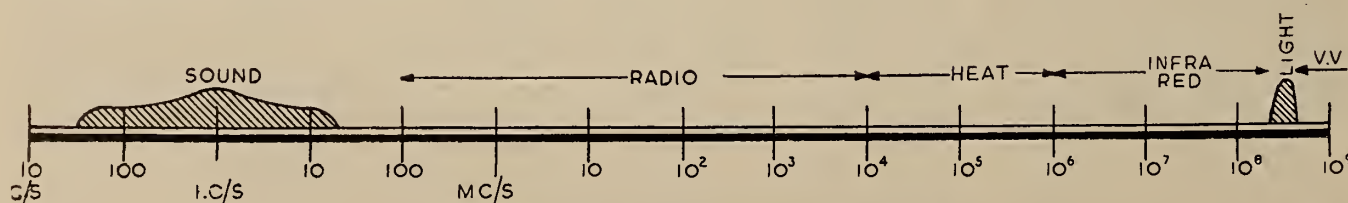


FIG. 1. Frequency bands in which ear and eye are sensitive.

† "Ideal Kinema" for August 12, 1948, p. 19.

Presenting: Robert E. Pulman

PROJECTION supervisor of more than 250 theatres is no soft touch in any country, but in once-merry England the job is a decelerated form of self-extinction, of men no less than material. What sort of man handles, and well, a job like this? Well, an outstanding example is Robert E. Pulman, projection major-domo for the famed Gaumont-British theatre circuit.

Meeting the fellow here in the U. S. A. last year, one was surprised to learn that this modern Job is now only 38 but has had 22 years of show business experience. Prerequisite to this sort of record is a solid background of industrious application, and this Bob has. He has studied projection technique in France, Holland, Belgium and Germany, and last year he made a two-months air tour of the U. S., during which he dug into all things cinematic, including the SMPE convention in Hollywood.

'If it Isn't on the Film . . .'

Bob knows the score relative to what constitutes recording the visual and sound images on motion picture film, and he recognizes the extreme importance of this phase of the art. He subscribes to the maxim that if it isn't on the film one can't project it onto a theatre screen.

But his chief interest is reproduction in the theatre, and over the years he has learned that good results stem only from the fusion of a high standard of craftsmanship and good equipment. "One half of this team won't turn the trick," says Bob. "We certainly envy you American fellows with a wealth of fine equipment available on every hand; yet the best equipment is hardly better than the second- or even the third-best if the projectionist doesn't deliver.

"As a matter of fact, if I were forced to choose between the best equipment and inferior craftsmanship and less good equipment and the best craftsmanship, I should unhesitatingly choose the latter combination. What kept British theatres going through all these trying years. Equipment? Yes; but equipment is decidedly not self-sustaining: it needs a sort of nurse to watch over it constantly in the form of craftsmanship."

Strenuous Off-Job Schedule

After getting his 250-odd theatres snugly bedded-down, Bob engages in a few off-the-job activities. He is a Fellow of the British Kinematographic Society, an active member of the Society of Motion Picture Engineers and of the Illuminating Engineering Society. He is very active on committees of the BKS, being a member of the Council and deputy-chairman of the theatre division. Weekly he lectures at the School of Photography and is a frequent contributor to technical magazines.

He also has served the Government in such matters as safety regulations, the training of ex-service personnel and as



Robert E. Pulman

an advisor to the British Standards Institute. During the war he was attached to the Admiralty and also worked on training films for all three of the services as well as for Combined Operations.

The G-B Theatres are part of the J. Arthur Rank interests, for whom Bob acts on several research committees. Incidentally, despite economic stringencies, Bob has succeeded in equipping more than 175 of his theatres with modern Suprex arc lamps. Further modernization is now underway.

Now, what do you suppose this fellow does for relaxation from technology when he's at home (when is he home)? Why, he's a radio "ham!" We know now why the British may go down but never are licked.

Lens Cleaning Do's and Don'ts

Exhibitor trade papers which go through the motion of "servicing" technically-minded readers by whipping up "projection sections" are in the main harmless enough and often worth the reading if only for the humor they induce. Everybody is aware of the reason for such sections, of course—a genuflec-

tion in the direction of projection equipment advertisers.

Not infrequently, however, some of the "tips" on projection equipment and technique appearing in these sections is so incorrect as to prove downright harmful to anybody misguided enough to accept these statements as gospel.

A case in point is the advice given recently that the proper way to clean a projection lens is to utilize a fluid concocted by mixing alcohol, water and a couple other ingredients with which to "scrub" the lens surface. Such prattle induces IP to publish again a method for cleaning lenses which is recognized to be wholly effective and safe, as follows:

Lenses are damaged by careless cleaning due to ignorance more than by any other cause. Absorbent cotton is cheap, soft, and in every way one of the best cleaning materials available. Breathing gently on the lens surface will moisten it and greatly facilitate the removal of dust and spots.

Cleaning solutions and soaps should be avoided!

Any foreign matter on the lens surface that will not yield to the moisture of the breath may be removed by *moistening* the cotton with carbon tetrachloride. Nothing more stringent than this should ever be used.

Always clean lenses with a circular motion, blowing strongly against the surface with the final strokes to remove any lint.

Remember that frequent cleaning and also actual testing of lenses which are in constant use is highly advisable—provided the job is done correctly. Accidental damage of a minor nature, or looseness of the lens in its mount due to vibration or shock, can be detected and remedied before it becomes so serious as to impair quality performance.

Deterioration in optical performance can be detected and traced to its source and can often be remedied if caught in time. The most common occurrence of this sort is the "feathering" of the balsam used to cement some of the glass elements together. Lenses can also be cleaned thoroughly by someone who understands the need for extreme care in handling.

DISPLAY AT N.T.S. LOS ANGELES BRANCH MARKS BACK TO OLDEN PROJECTION DAYS



Starting from the right, first mechanism is the No. 1 Powers projector made by Nicholas Power Co. at 115 Nassau St., N. Y. City in the early 1900's. Next is the Edengraph, forerunner of the Simplex and developed by Frank Cannock. Other three mechanisms are Simplex—the Standard, Super and the current E-7 models.



LETTERS TO THE EDITOR

To the Editor of IP:

I agree with Mr. Smollin's estimate of the new acetate film.¹ I thought that Dr. Fordyce handled his assignment adeptly: his foray² was neither anguished nor blatant—just soothingly restrained. However, the good Doctor failed to convince me that the new stock is the ticket.

I am able to splice the stuff OK with my own mixture of acetic acid, acetone and chloroform (the regular cements are different), so I haven't given that aspect much thought. My criticism concerns the poor wearing quality of the stuff and the alarming ease with which it tears. The Eastman pre-release tests were undoubtedly run on tip-top equipment, with every element therein right up to snuff. But how many theatres, including first runs, approach this high mark?

Granted that acetate holds up better than nitrate when tucked away in a vault and never used. But we don't store film; we show it. Or try to. Acetate's just lovely for home use; but theatre conditions are vastly different. I should like it if Eastman made nitrate stock twice as tough as it now is, the while they made toothbrushes or stockings out of acetate.

ROBERT A. MITCHELL

To the Editor of IP:

As a "swing" man I work in several theatres and therefore encounter a wide variety of both prints and equipments. I just can't see this new acetate stock in terms of strength and wearing quality, ease of splicing, and, most important, sharpness of focus. Only a few of the boys have stressed the focus angle, but I'll string along with this minority view.

On a Trucolor (Republic) print recently I scraped both sides of the film, applied an "approved" cement and held the splice down for almost a minute. When I rewound the film it came apart. It required 9 splices before getting one that held. I know now why a majority of projectionists make scotch tape splices on these color prints.

I ran that black-and-white acetate print "If Winter Comes," and while the splices seemed stronger, they still came apart after being subjected to the heat of a few run-throughs the projector. Summary: this new acetate stock just ain't got what it takes.

CHARLES R. BROWN
IA Local 181, Baltimore, Maryland

To the Editor of IP:

I'm convinced the majority of bum print trouble starts with the small narrow splices made before processing and those made subsequently before the first run. Improper threading compounds this basic fault, and plenty of bum prints leave the hoity-toity first-runs. Plenty of fellows still thread-up

improperly, and there is no dearth of those who are always trying to beat their best previous speed record on a hand rewind.

Those bleats from the exchange people in IP for August (p. 16) sure are eye-openers: how can those exchange gals properly inspect and splice film while on a treadmill? By the way, what gives with these abused exchange people? Exchange splices don't hold because there is no time allowed for sufficient pressure to be exerted (how can there be?). Still, I must throw an orchid to the Paramount Kansas City exchange: its stuff is uniformly good and the splices hold.

Had a letter recently from an exchange manager requesting that I inspect my projectors to determine the cause of a print being badly scratched (samples enclosed). I went to the cabinet and looked at the trailers that had been spliced directly to the print in question. Not a sign of a scratch!

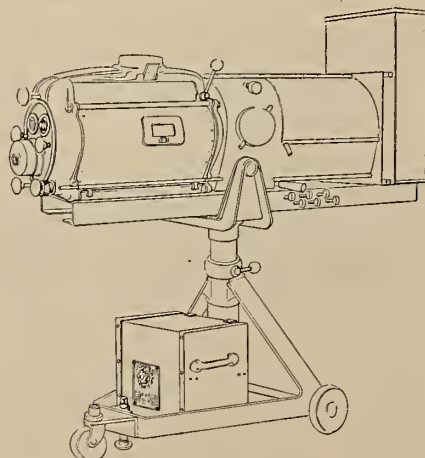
Regarding Mr. Mitchell's article in IP for August³: I believe that he should have advised turning the intermittent sprocket slowly through two spaces instead of the two and one-half spaces he mentions. I align the center point of a shutter blade with the center stud on the rear shutter

³ "Notes on Projector Maintenance," by Robert A. Mitchell; IP for August, p. 6.

New, Varied Line of H-I, Reflector Spotlamps by Strong

A new and complete line of high intensity reflector-type arc spotlamps for the entire amusement field has just been announced by The Strong Electric Corp. A variety of sizes and capacities for every requirement is available, from a small, low-priced portable model known as the "Trouper" for night clubs and theatres, to a large versatile lamp, the "Big Top," for ice shows, stadiums, circuses, arenas and convention halls.

These new spotlamps employ as a light



Outline view of new Strong high-intensity, reflector-type spotlight, one in a varied line suitable for all lighting tasks.

guard support (Super Simplex), which seems to be easier than trying to set a blade squarely over the aperture.

In closing, I think that projectionists should always bear in mind the fact that film cement is a *bonding* agent which does not actually *cement* the film together but only softens it up so that it will join when it returns to its hardened, and normal, state. This bears directly on the two requisites for a good splice: clean scraping of both ends and a combination of sufficient time and pressure in the splicer. I just don't savvy those fellows who sure do scrape both sides of the film—but on the same end!

DOUGLAS FRAZEE

Marshall, Missouri

[NOTE: Apropos the foregoing comment is the following statement by Mr. R. A. Mitchell, author of the article in question:

"Your correspondent is absolutely correct in his assertion that the intermittent sprocket should be turned through two spaces instead of two and one-half. Placing a reference mark on any tooth of the sprocket when at rest, the mechanism should be stopped when the second tooth from the first comes under the marker. Or, designating the first tooth No. 1, the mechanism is stopped on No. 3 tooth—two spaces in all.

"Relative to setting the shutter blade, this involves only a different interpretation of terms. I, too, use the outer stud of the shutter guard when operating on

source the long-proven high-intensity, reflector-type lamp used universally for motion picture projection and which results in a snow-white light in such tremendous volume as to make the presentation fairly sparkle. This, plus the use of an ingenious two-element, variable-focus projection lens system, results in uniform lighting efficiency and clean sharp edges, from a head spot continuously through to a full flood. Lightweight construction and delicate balance permit one-hand control and make for easy following of the fastest action. The lamp can be swung through a full 360 degrees horizontally and compressed to angles of 45 degrees or more.

These spotlamps are equipped with a color boomerang, fading iris, ultra-violet filters and simplified automatic carbon feed. The masking control has both vertical and horizontal adjustment blades which can be angled at 45-degree planes from normal. The low power requirements reduce projection room temperatures and make the use of large motor generators unnecessary, since only a small rectifier is required for the arc power.

Literature on the Strong line of spotlamps is available free from the Strong Electric Corp., 14 City Park, Toledo 2.

¹ "Letters to the Editor"; IP for August 1948, p. 14.
² "New Acetate Film for Release Prints," by Dr. Charles R. Fordyce; IP for June, 1948, p. 5.

Simplex or similar rear-shutter mechanisms. However, I intended my suggestions to cover all types of projectors, front-shutter units as well as rear-shutter types, Motiograph, Brenkert, *etc.*, as well as Simplex.”]

American Standard Definition For Photo ‘Safety’ Film

The American Standard definition of Safety Photographic Film (Z38.3.1-1943) defines a photographic film which is no more hazardous than common newsprint paper, reports the SMPE. In order to be classified as Safety Photographic Film, a photographic film must be (a) difficult to ignite, (b) slow-burning, and (c) evolve a limited amount of toxic oxides of nitrogen during decomposition.

The ease of ignition is determined by measuring the time of ignition after subjecting the sample to a uniformly maintained high temperature. The requirement for ease of ignition and the test method are the same as those specified by the British Standard definition of Cinematograph “Safety” Film (1939) and other European standards. The rapidity of burning and the method of measuring that characteristic are also the same as specified by the British.

The toxic gases evolved when photo-

AnSCO Color Film Requires No Special Handling, Splicing

Projectionists in various parts of the country have been receiving recently postcards from a film distributor which, in part, state:

“This (AnSCO) print is fine-grain release positive safety film. It is necessary that you make splices with Kodak Cement of either *yellow* or *pink* color . . .”

Projectionists should not be flurried by these instructions. AnSCO Color theatre release prints, unlike some other color prints, require no special handling. Nor is there any need for a distinguishing mark on these prints to indicate correct

threading, as the emulsion is on only one side of the base and the image is oriented so that the procedure for threading is the same as for conventional black-and-white film—that is, emulsion to light source.

The base of AnSCO Color film is of the familiar *nitrate* type and requires no special cement for splicing. Projectionists are well advised, however, to use the new common All-Purpose cement which is suitable for *all* types of film. The perforations on AnSCO Color film are identical with those on the usual b-and-w prints.

graphic films of cellulose nitrate are decomposed by heat are oxides of nitrogen, carbon monoxide, and hydrocyanic acid. Laboratory tests indicate that only oxides of nitrogen and carbon monoxide are evolved in sufficient quantities to constitute an appreciable hazard. These tests also indicate that photographic film does not evolve more carbon monoxide than does common newsprint paper when equal quantities of film and paper are decomposed in the same manner.

The maximum quantity of oxides of nitrogen which can evolve when safety photographic film decomposes is limited

by stipulating in the definition the maximum nitrogen (present as nitrate) content of the material. Fumes from photographic film that comply with this standard will not be significantly different from fumes evolved from ordinary newsprint paper decomposed under the same conditions.

Photographic films made from materials for which this definition applies but which do not comply in one or more respects are not necessarily hazardous. For example, acetate film may fail to comply with the maximum nitrogen content specified in this definition and still not be significantly more hazardous than com-

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mon newsprint paper under ordinary conditions.

Consideration was given to a maximum nitrogen content of 0.72% and had some evidence that a safety film containing that proportion of nitrogen was no more toxic than films with a lower content. However, the specification was set at a lower figure to correspond with current requirements of the Underwriters' Laboratories. The method for measuring the nitrogen content was adopted from the Summary of *Requirements for Slow Burning Cellulose Acetate Film*, Underwriters' Laboratories, Inc., Chicago, Illinois.

Limitations of Definition

The definition of Safety Photographic Film applies only to films the supports for which comprise cellulose esters of simple fatty acids, combinations of cellulose esters and nitrate, and regenerated cellulose. Should photographic films in the future be made of other materials, this definition may have to be modified and additional requirements incorporated in the definition, which now specifies ignition time and burning time, outlines in detail the methods for measuring these two characteristics, and, in addition, presents a standardized procedure for de-

termining nitrogen content of film samples.

This standard, a 6-page pamphlet, is available from the SMPE, also from American Standards Association, 70 East 45th Street, New York 17, N. Y.

NOTE: The significance of the foregoing data is that no film that does not conform precisely to the physical characteristics set forth in the American Standard may properly be labelled or considered as "safety" film. There are probably as many variations of "safety" film, in terms of physical characteristics, as there are companies making acetate-base stock.

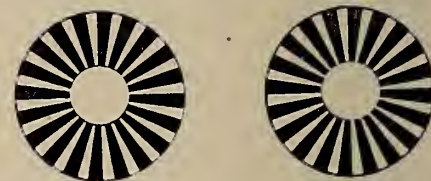
Significantly, Eastman carefully avoids designating its new acetate-base stock as "safety" film, their designation for this stock being "high acetyl acetate film." Especially noteworthy is the fact that no manufacturer of this new acetate stock (Eastman, Du Pont, Ansco, *et al*) has made available specific data regarding its exact physical characteristics in terms of combustibility, tensile strength, durability, and the nature and degree of toxic gases emanating from the film when it is ignited.

The film industry in general, and the exhibition field in particular, it seems to IP, are entitled to much more information relative to this new film than has been made available thus far, even those papers presented before engineering societies having been couched in very general terms.—Ed.

Simple Strobe Service Tip

Acceding to recent requests by Maurice Rushworth, Baltimore; Harvey Perkins, Los Angeles, and Raymond Spitzcain, New York—and, we hope, for the benefit of many other projectionists—we are reprinting here a very simple yet highly useful servicing tip supplied by Altec Service Corp. which appeared in IP several years ago:

Cut out one of the Strobe discs shown here and paste it to the end of a sprocket, using household cement or shellac. After the cement has thoroughly dried, hold a lamp in front of the Strobe disc and observe its motion. The lamp, of course, must be plugged to a 60-cycle current



source. For better results, use a small neon light, available at any radio store.

If the Strobe disc appears to rotate in the same direction as the sprocket, the projector is running *above* normal speed. If it appears to rotate in the opposite direction, it is running *below* normal speed. If it appears to stand still, it is running at the *normal* speed of 360 r.p.m.

If the projector is running above or below normal speed, the exact speed may be determined by counting the number of times the Strobe disc appears to rotate in one minute. For example, suppose that the disc appears to rotate six times per minute in the same direction as the sprocket is turning: then the actual speed of the sprocket is 360 plus 6, or 366 r.p.m. If the disc is turning in the opposite direction, then the speed is 360 minus 6, or 354 r.p.m. Expressed in terms of film in feet per minute the speed will be

$$360 + 6 \\ \text{—————} \times 90 = 91.5 \text{ feet per minute}$$

or, if the projector is running slow, the speed will be

$$360 - 6 \\ \text{—————} \times 90 = 88.5 \text{ feet per minute.}$$

TESMA-TEDPA Meet at St. Louis

Final arrangements have been concluded for the joint TESMA-TEDPA meeting, with a cooperative assist from the Motion Picture Theatre Owners of America, scheduled for the Hotel Jefferson in St. Louis, Sept. 28-30 inclusive. Now firmly established as the sole national equipment show of any significance, this annual meeting promises to be bigger this year than ever before, more so in terms of the number of exhibitors

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rather than in the unveiling of any radically new equipment.

The rapidly growing membership list of TESMA, the manufacturers' group, is reflected in the frantic search for additional exhibition space at the convention no less than for hotel room reservations.

Life-Size Images in New RCA Tv Set for Public Places

Life-size Tv pictures by means of the first commercial unit designed specifically for presenting Tv programs to large audiences (clubs, schools, hotels, terminals, etc.) is announced by RCA. Offering the added brilliance and clarity obtained with reflective optical systems, as compared with those employing refractive optics, the new projector produces images which may be tailored to suit screen sizes ranging from 3 by 4 to about 7 x 9 feet.

The projector, designated Model TLS-86, is now in quantity production.

The Schmidt-type reflective optical system employed produces bright, clear pictures either on the face of a reflective-surfaced opaque screen or, by rear projection, on a translucent screen. An image about 63 square feet is obtained with the projector located 17 feet from the screen. A simple focusing system permits adjustment for a shorter projection throw, providing a smaller image. The unit may be mounted on casters for easy dollying to the desired position in relation to the screen.

Electronic Tuning, Automatic Station Lock

Simple to operate, the projector permits instant selection of a desired station. Control adjustment can be made without interfering with the projected picture. Employing an all-electronic tuning system, the circuit automatically locks the set in step with the incoming program, insuring well-framed, steady pictures. A 10-inch speaker in an acoustically matched cabinet operates adjacent to the projection screen.

The projection system utilizes a 5-inch kinescope, the face of which projects its image into a 14-inch spherical mirror. This light-gathering mirror reflects the image through a 9¼-inch aspherical correcting lens to form the enlarged screen image.

British Film Fire Experiment

Appended is the report of an interesting demonstration of means for coping with nitrate film fires, as recounted by R. Howard Cricks, technical editor of "Ideal Kinema," British trade paper:

"The dangers of nitrate base were vividly brought home to us recently when the Admiralty film, 'Fighting Film Fires,' was projected. The film starts with some examples of attempts to extinguish blazing reels of film by means of various types of fire extinguishers, concluding with a demonstration that the only satisfactory extinguisher is the gas-water type, which, if it is to succeed, must be applied within a few seconds of the start of the fire.

"One important demonstration in this section was of the futility of the asbestos

blanket so beloved of inspectors. It was shown that when a blanket was thrown over a blazing reel of film, the inflammable gases re-ignited around the edges of the blanket.

"There followed a dramatic episode show-

ing the absolute necessity for a projectionist to keep his head in the event of a fire, and stressing the lesson that the magazine containing the ignited film *must on no account be opened*. Finally, we saw 20 reels of film (the quantity allowed to be stored in the rewind room) set off in a mighty blaze which sent clouds of smoke billowing into the sky."

IA ELECTIONS

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Edward P. Daley, *pres.*; Talbot Peterson, *bus. rep.*; Daniel H. Schwartz, *sec.-treas.*; Frank C. Peters, *sgt.-at-arms*; John J. Ticky, Joseph S. Snape, Butler W. Gilman and Frank Peters, *exec. board*.

LOCAL 576, MANSFIELD, OHIO

Clair D. Pitts, *pres.*; Howard E. McAllister, *vice-pres.*; A. F. Esbenschade, *bus. rep.*; D. A. Guthrie, *sec.*; Howard L. Straub, *treas.*

Genesis of the 'Kodak' Trade-Mark

"Kodak," a word coined by George Eastman came into being 60 years ago, being registered as a U. S. trade-mark on September 4, 1888. The word literally came "out of the ether." Except as it describes a kind of camera and photographic equipment, it is as meaningless as a child's first "goo."

The year Eastman designed his first

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camera, he also devised the word—by experimenting with letters. He wanted a word easily spelled and pronounced. He toyed with letters until he arranged them to his satisfaction. He accounted for the word thus:

"I devised the name myself. A trade-mark



EVANS SPROTT—General Manager, Bijou Amusement Company, Nashville, Tenn.—declares:

"To me, RCA Service is a good business investment. It pays for itself by keeping my equipment free from trouble and my patrons better satisfied."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, N. J.

should be short, vigorous, incapable of being so misspelled as to destroy its identity and, to satisfy trade-mark laws, it must mean nothing. The letter 'K' was a favorite with me—it seemed strong, incisive. Therefore, starting with 'K,' it became a question of trying out many combinations of letters."

That, despite imaginative tales to the contrary, is the source of the now household word—Kodak.

Weber Syncrofilm Export to Robin

Exclusive export rights to Syncrofilm visual and sound projection equipment, manufactured by Weber Machine Corp., Rochester, N. Y., have been granted to J. E. Robin, New York, according to a joint announcement by Carl Weber and Emil Kern. Effective immediately, the deal is for a long term.

RCA's Acetate Service Test Reels

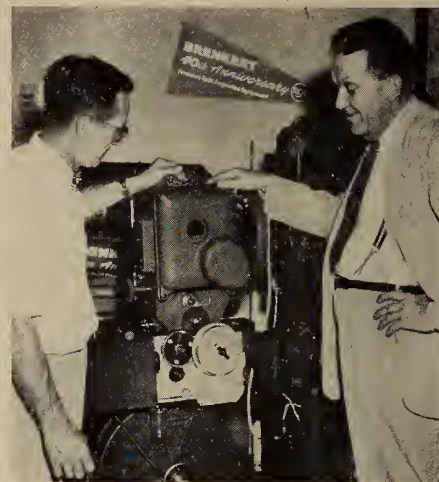
Evidencing the increasing use of acetate film in the exhibition field, as reported in IP over the past year, is the announcement that all new test films used by RCA theatre service engineers will hereafter be printed on safety stock.

St. Louis Supply Houses Merge

Cine Supply Co. and Exhibitors Supply Co., both of St. Louis, have merged and will in future be known as St. Louis Theatre Supply Co., at 3310 Olive St. Owners of the new firm are Arch Hosier and J. Eldon Peek.

Old-Time Projection Soiree

Explaining the new Brenkert BX 60 projector, Wayne Brenkert (left) has an appreciative auditor in W. H. Fowler, business agent of Local 322, Charlotte, N. C. Occasion was a demonstration



staged recently for Local 322 members by Southeastern Theatre Equipment Co. of Charlotte.

Fowler reports that Wayne gave a "splendid demonstration and proved himself a first-rate technician by covering the BX 60 thoroughly and, in addition, discussing a raft of other projection topics." Following the demonstration Southeastern weighed in with a fine buffet spread, with everybody present having a swell time.

The following day Brenkert toured local projection rooms and swapped shop-talk with the boys. "The event sure reminded us of old times," reports Fowler, "and everybody concerned did themselves a lot of good."

ANNOUNCING THE APPOINTMENT OF J. E. ROBIN, INC.

as general sales representative throughout continental United States, Canada and all foreign countries, for

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makers of precision projection and sound systems for over 20 years. Weber products licensed under Western Electric Patents include

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PERSONNEL

It's parka hoods and pith helmets for theatre servicemen now, with overseas assignments sending three RCA engineers ranging over four continents. W. HYLER, of the Philadelphia district, goes to Africa and Europe for six weeks; BILL BRADLEY leaves Atlanta for five weeks in the Caribbean and Panama areas, and BOB DAVIS checks out of San Francisco for a month in Alaska.

All the boys will service Navy-operated theatres, p. a. systems and 16-mm projector equipment.

"Honorary Companion of the Military Division of the Most Honorable Order of the Bath" is what it says on the latest honor from Great Britain for EDWARD P. CURTIS, vice president of Eastman Kodak Co. in charge of all motion picture sales. Back in 1932 when we first knew Ted, he held, from World War I, only the D.S.C., Croix de Guerre, Order of St. Anne, Legion of Merit and the Legion of Honor.

In World War II, as chief of staff of the U. S. Strategic Air Forces in Europe, Major General Curtis added a D. S. M. to his stockpile of honors.

WAVELENGTHS AND FREQUENCIES

(Continued from page 22)

electro-magnetic waves. Thus we can see that a sound of 1,100 c/s will have a wavelength of 1 foot, and one of 110 c/s, 10 feet. Coming into the electro-magnetic range, a radio wavelength of 1 metre will have a frequency of 300,000,000 c/s or 300 mc/s. Radio waves are generally expressed in terms of wavelength. Thus the television wavelength of 6 metres has a frequency of 50 mc/s, and the centimetric waves used for radar extend up to frequencies of hundreds of millions.

When we reach these high frequencies we are coming into the region of heat rays and, as a matter of fact, the radar frequencies have a considerable heating effect which gives them both harmful and therapeutic properties. Heat waves merge imperceptibly into the infra-red.

Perception of Light

Then, at frequencies of about 500 billion c/s, we come to a narrow band of frequencies which are of prime importance: those which our eyes can perceive in the form of light. In extent less than an octave, the wavelengths of light range from 0.7 to 0.4 μ (the μ or micron is one-thousandth of a millimetre), the longest rays, of course, being the red, and the shortest the violet.

To this tiny proportion only of the frequency band the human eye is sensitive. Within this range lie all the beauties of glorious Technicolor. In little more than this tiny range lie the transmissivity of glass and the image-forming power of lenses. Within the visible and infra-red bands lies the sensitivity of

photo-cells, and within the visible and ultra-violet the sensitivity of photographic emulsions, the ultra-violet, of course, being the continuation of light waves beyond the violet, or 4 μ .

Beyond the ultra-violet again comes the X-rays which, due to their shortness, can penetrate solid substances. The term "hard" X-ray indicates rays that can penetrate a greater density of material and are of a shorter wavelength, being produced by a discharge at a higher voltage.

Still farther come those rays which are still largely wrapped in mystery, the so-called cosmic rays, which it has been suggested reach us not only from the sun but in a large proportion from the stars, and which are so penetrating that they have been detected in the deepest mines, and so numerous before they strike the atmosphere that it is believed that on high peaks they would, in course of time, be a danger to life.

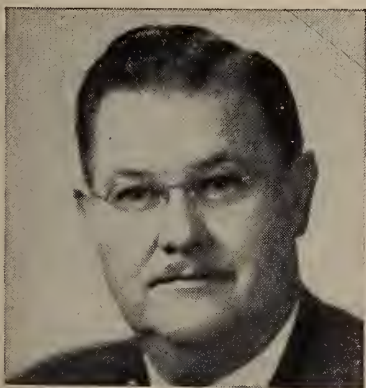
There is one final point to which reference must be made: the method by which it is possible to distinguish rays of different wavelengths. Throughout the range which is so far investigated there is one answer to the problem: *resonance*.

How the Ear Hears

We know that a radio set is made sensitive to a particular frequency by means of a resonant circuit, which consists essentially of a choke and a condenser; by varying the values of these two components we can cause the circuit to resonate at any frequency within a given waveband, and to this particular frequency *only* will the circuit then be sensitive.

Even more marvelous is the method by which Nature makes use of this principle. Hidden away in the inner ear is an amazing device known as the cochlea, which consists of a housing like a snail's shell, lined with innumerable tiny hairs of varying length. The theory is that each hair has a natural periodicity corresponding to the frequency of a particular note, and when, through the eardrum and the bones of the middle ear, the fluid which fills the cochlea vibrates, that hair whose periodicity corresponds to the frequency, vibrates in sympathy and conveys a message to the brain.

It must be assumed, although there is yet no proof of it, that a similar func-



ROY L. COCHRANE—Owner and Manager, Juroy Theatre, North Little Rock, Arkansas—says:

"In three years of operation I have used RCA Service and have not lost one minute of time. Equipment is as good as at time of installation."

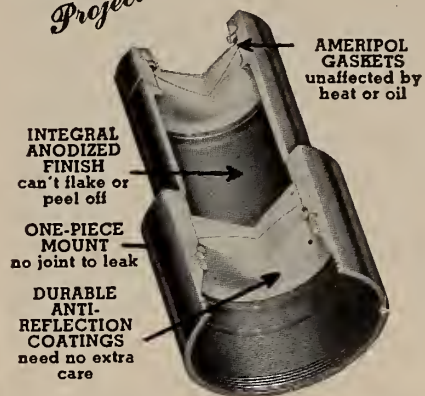
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Community Chest Drive On

Fall brings golden leaves and apple cider and RED FEATHERS. A million Americans are devoting their time and energy this autumn to help make a success of their local Community Chest campaign. RED FEATHERS decorate the lapels of workers and givers, line the streets and windows of your town and ours, from the Atlantic to the Pacific.

Earn your RED FEATHER by pledging your share for the RED FEATHER SERVICES in your nearest Community Chest. Give . . . give ENOUGH!

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See Why it's The
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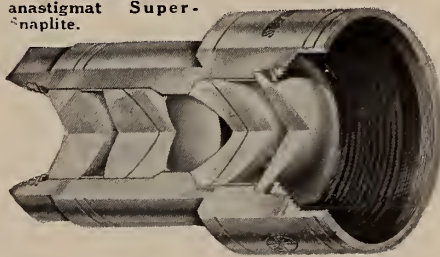
Each Snaplite lens is distinguished by its sleek black aluminum mounting. The black anodized finish is an integral part of the aluminum—can't chip, flake, or peel off.

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TROUBLE-FREE performance is assured by the hermetically sealed construction of Snaplite and Super-Snaplite lenses. They never need to be taken apart for cleaning—no dust or oil can enter! And their anodized finishes can't flake off!

For brighter . . . sharper . . . clearer pictures, use f/2.0 Snaplites or f/1.9 Super-Snaplites in your projectors! Full details of all Snaplite lenses are given in Bulletin 204, available from your local supply dealer.

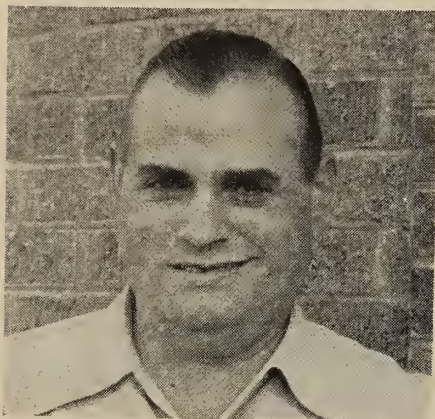
The fastest lens made—the f/1.9 six-element anastigmat Super-Snaplite.



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tion enables the eye to distinguish colors. In this case, however, there are only three groups of receptors in the retina—color-sensitive nerve-ends which are sensitive, respectively, to red, green and



HARRY MELCHER—General Manager, Eskin Theatres, Inc., Milwaukee, Wis.—writes:

"Patron consideration requires the finest in sound. RCA Service insures this quality."

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NEW YORK, N. Y.

blue, and transmitting a message to the brain when they are caused to resonate at a suitable frequency.

Any color seen by the eye influences one or more of these groups of receptors. The fact that there are only three primary colors to which the eye is sensitive is, of course, the basis of the three-color systems, such as Technicolor.

Although there is discussed herein a truly staggering band of wavelengths, there is reason to believe that even this vast range is much exceeded in Nature. We have no proof that frequencies above 1014 megacycles exist, although there is no reason why they should not. There is reason to believe, however, that frequencies beyond the left-hand end of the chart (Fig. 1) play an important part in our life, notably in astronomy, where frequencies ranging from minutes to millions of years have been detected or calculated.

IN THE SPOTLIGHT

(Continued from page 21)

visited the Hollenden Hotel every night after the games and proudly displayed his IA card to his fans.

Two other major league ball players, Bearden, pitcher for the Indians, and Peanuts Lowry of the Chicago Cubs, hold IA cards. They are members of Hollywood Local 80 and work in the studios when the baseball season ends.

• Mike Casey, business agent for Local 53, Springfield, Mass. for many years, died shortly after returning home from this last Convention. He had been very ill for quite some time but recovered

sufficiently to make the trip to Cleveland. Mike had attended every Convention since 1926 and wished to keep his record unbroken. We sympathize deeply with his folks.

• The headquarters of International Projector Corp., in charge of amiable Herb Griffin, was another popular gathering spot for the delegates, particularly with the old-time loyal Simplex rooters. Herb was on duty almost 24 hours a day, hosting the scores of visitors. Refreshments were plentiful—as usual.

• The Canadian delegation ((11th District) went into session as soon as they arrived in Cleveland and re-elected Hugh J. Sedgwick as District secretary. Hugh is also secretary-business agent of Local 303, Hamilton, Ont., a post he has held for many years. (A profile on Hugh will appear in a forthcoming issue of IP).

• A note of tragedy entered into the Convention proceedings when it was learned that the wife of one of the delegates died suddenly in their room at the Auditorium Hotel. This is the second blow to befall George Vleck, delegate from Local 337, Utica, N. Y., the bereaved husband, this past summer. He lost a 22-year old daughter in June. It is believed that Mrs. Vleck's death was hastened by grief over the loss of their daughter.

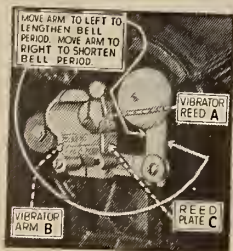
• We saw many new faces at the Convention—comparative newcomers to the organization. One of these, W. T. Crawford, business agent of Local 548, Paris, Texas, introduced himself to us at the suggestion of Paul Lehnhoff, secretary of his Local, who was not a delegate.

• We were jolted right out of our smugness when we were told that Ted, son of Lou Krouse, former IA secretary-treasurer, is now interning at the University of Pennsylvania Hospital. It doesn't seem so awfully long ago since we coddled young Krouse on our knees, and it was a distinct thrill to learn that he now is a full-fledged doctor. We wish him a most successful career.

• "Open House" was the slogan of Chicago Local 110. In their usual open-handed fashion the Chicago delegates rolled out the welcome mat in front of their stand—a three-room suite at the Hollenden Hotel—and open house it was for their entire stay. Visitors were regaled with refreshments and entertainment, and it was here that Neal Bishop mystified many of us with his clever card tricks. Host Gene Atkinson, assisted by Clarence Jalas, James Gorman and the rest of the Chicago boys, really went to town and their hospitality will long be remembered by all those who partook of it.

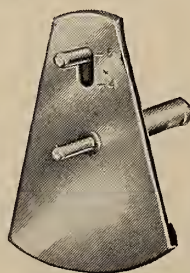
• "The History of the IATSE" a 16-mm

PROJECTIONIST FAVORITES for the "PERFECT SHOW"



REEL-END SIGNALS

Essannay REEL-END SIGNALS are available for all projectors. Do not touch film or reel, thus eliminating film scratching. Strictly mechanical, require no batteries, no transformers, no governors, and no presetting. Essannay REEL-END SIGNALS can be installed in five minutes . . . can be counted on for years of day-in, day-out, trouble-free service.



UNIVERSAL REWIND MULE

No more delayed shows, due to broken rewind keys and shafts . . . No more fevered dismantling of vital equipment to install new parts . . . No more need for makeshift rewind collars in the projection booth.

Simple, rugged, and positively foolproof, the new Essannay REWIND Drive "MULE" fits any enclosed rewind. A flick of the thumb, and it is set to take 4", 5" and Exchange reels.

See our exhibit in Booth No. 41, TESMA Show, Jefferson Hotel, St. Louis, Mo., Sept. 28-29-30.

ESSANNAY ELECTRIC MANUFACTURING CO. . . 1438 NORTH CLARK STREET, CHICAGO 10

movie depicting the progress of the IA from its early days to the present, was given a surprise showing at the Auditorium. This film was made under the direction of Harry Shiffman, secretary-business agent of Hollywood Local 789 (studio cine-technicians), and is available to all Local Unions for \$35 complete.

- The clearest speaking voice on the Convention floor was that of Herbert Aller, secretary-business agent of Hollywood Local 659, when he nominated Carl Cooper for re-election as 7th IA vice-president. The nomination was seconded by Steve Newman, International representative, who celebrated his 70th birthday the previous Sunday.

- The delegation from Los Angeles Local 150 entertained lavishly at their Statler Hotel headquarters. All the Californians seemed to congregate there and George Schaffer, business agent of Local 150, was the busiest man in the place looking after the needs of his guests. These Los Angeles boys certainly do things on a grand scale—it must be the wide open spaces that make them that way.

- Rae Odett and J. B. (Pop) Kenton, old-line members of Los Angeles Local 150, were recently awarded gold life membership cards in the Local. Pop is the father of Earl Kenton, producer and director for Monogram Pictures.

- The lobby of the Hotel Statler was the scene of a reunion between two cousins who hadn't seen each other for 40 years. Allen Tindal, delegate from

Local 253, Rochester, N. Y., while standing in the lobby of the hotel spied a man coming towards him who he thought might be Earl Tindal, cousin he last saw when he was a mere lad. They both recognized each other at the same time and, needless to say, they had a joyous reunion.

- An orchid to Bill Kunzmann and the rest of the National Carbon men for their grand hospitality to the IA delegates. Dave Joy, Paul Reis, C. E. Heppberger and W. W. Lozier all cooperated in making the National Carbon headquarters a *must* with our boys.

- News of Babe Ruth's death reached the Convention hall and, at the request of President Walsh, all delegates and visitors arose and stood in silence for one minute in respect to the memory of this great sportsman.

- To many old-timers, and to this writer in particular, part of the thrill in attending these conclaves lies in the meeting of old friends gathered together from all parts of the country. It was our distinct pleasure to spend some time with our good friend, "Honest John" Fitzgerald, Cleveland Local 27, discussing many things of mutual interest. We have known John for many, many years and have always had the greatest admiration for his sincerity and honesty. We hope to have the pleasure of getting together with John Fitzgerald at many more such gatherings.

- We couldn't help noticing the absence

of many old-timers at this past Convention. Many of them have passed on and many of those still alive have retired from all union activities. A meeting with Charlie Crickmore, delegate from Local



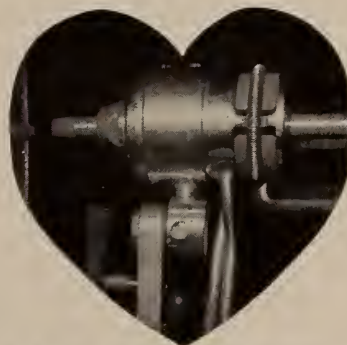
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15, Seattle, Wash., brought home the fact that we two are the only remaining ex-assistant presidents of the IA: Crickmore having served under Charlie Shay, and yours truly under William F. Canavan.

• George Ormstead, the only survivor of New York Local No. 1's charter members, delivered a short address to the assembled delegates, speaking in clear, firm tones which belied his 86 years. Ormstead is a kindly, dignified gentleman, who still works at the craft in Los Angeles.

• Benjamin Hull, president of Local 186, Springfield, Mass., was scheduled to address the assembly but certain im-

portant matters came up that demanded his immediate return to Springfield. Hull is an official of the Massachusetts State Federation of Labor and is working closely on labor matters with Governor Bradford of his State, who is strongly pro-labor.

• Tom O'Brien, president of NATKE (equivalent to our own IA), was one of the Convention speakers and kept the delegates in constant gales of laughter with his witty remarks. He has the distinction of being the first Englishman to hold a gold honorary membership card in the Alliance.

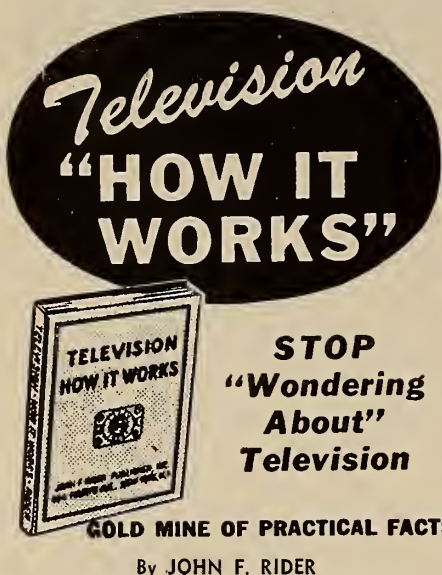
We had the good fortune to spend some time in Tom's company and we

came away with the impression that here was a man with a remarkably keen insight and one who could master any given situation. He attributes much of his success as a labor leader to the fact that when confronted with a difficult situation, he always calls upon the old-timers in his organization for suggestions. Weighing their combined opinions, he usually comes up with a solution to his problem.

• Last month's visitors to the offices of IP included: W. Young Louis, Local 762, San Luis Obispo, Calif.; Elmer Olson, Local 744, Cadillac, Mich.; George Schaffer, Local 150, Los Angeles; Alonzo Bennett, Local 521, Long Beach, Calif.; Edward Whitford, Local 376, Syracuse, N. Y., and John Griffiths, Local 273, New Haven, Conn.

• It is customary for exhibitors and Local Unions to begin negotiations for new contracts at least a month or two prior to the expiration of existing contracts. Even if the talks extend beyond the expiration date, the theatres continue operating and the projectionists remain on their jobs during the negotiations.

Two New York exhibitors, without a single day's notice arbitrarily discharged their union projectionists August 31 last, the day their contracts with Local 306 expired, and immediately engaged non-union men in their places. After a few days of intensive picketing by Local 306 plus poor box-office receipts, these exhibitors experienced a change of heart and requested that the Local open negotiations for new contracts. Meanwhile the union projectionists have returned to their jobs pending final settlement of the new contracts.



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TRANSISTOR MAY REPLACE ALL VACUUM TUBES
(Continued from page 19)

the load. The output is limited in present designs to about 50 milliwatts. The output impedance of such a transistor is from 1000 to 10,000 ohms.

Performs Variety of Tasks

In one demonstration, a Transistor was used to amplify the electrical speech waves traveling between two telephones, a function now performed by vacuum tubes. In another, the audience heard a radio broadcast from a commercial radio set rebuilt so as to operate entirely without vacuum tubes, but using, instead, several of the tiny Transistors to provide amplification.

A Transistor was also used to generate a standard frequency tone, thus demonstrating its role as an oscillator.

The demonstrations showed that these new devices are useful in a regular

broadcast receiver to replace all tubes when a power output level of more than 50 milliwatts is not required. For larger outputs a vacuum-tube amplifier stage of the usual type can be added. The Transistor would replace any of the tubes in a television set, for example, where the 50-milliwatt, 10-megacycle limit were not exceeded.

The Transistor answers a question scientists have been pondering for many years—how to make semi-conductors amplify and thus provide a simpler, more rugged, smaller device that can perform the functions of a vacuum tube.

Contacts are made to the semi-conductor only two-thousandths of an inch apart. Input power delivered to one of these contacts is amplified at least 100-fold and transmitted to the other terminal where it is delivered to an output circuit. The Transistor is energized by voltage supplies, such as batteries, which apply bias voltages to the two points; the power actually consumed is less than a tenth of that used by an ordinary flashlight bulb!

The Amplification Process

The amplification process can be understood in terms such as that the input point is surrounded by an "area of interaction." Within this area the electronic structure of the semi-conductor is modified by the input current. Now, if the output point is placed in this area, the output current can be controlled by the input current.

The germanium is prepared in the same way as for high back-voltage rectifiers, with tungsten or phosphor-bronze wires with precisely formed points. The contact area diameter may be of the order of .001 in. The input contact which becomes the "grid" is called the "emitter" and the output contact the "collector," which may become important items in an engineer's vocabulary. The high reverse current applied to the collector is large enough to make the output current as great as or greater than the emitter current.

In semi-conductors, such as silicon and germanium, some metallic oxides and other compounds, there may be as few as one current-carrying electron for every million atoms. But—and this is the significant feature—this number of carriers may be varied 1000-fold or more by changing the electronic structure of the materials. Hence the current flowing through the semi-conductor can be controlled.


The outlook for the transistor is pretty

definitely established. Having a long (yet undetermined) life, instant operation (no filaments to heat up), small compact size, and requiring only moderate voltages in the power supply, these

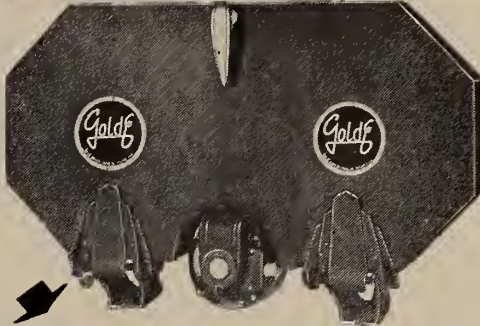
units will have many radio and communication applications when they pass from the research laboratory and get into production. The latter will occur in the future.



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fered outside the theatre. The Altec engineer is a real friend of show business because he enables us to get the fullest value out of what is on the sound track. Furthermore, that is his sole job, just as it is the sole job of the entire Altec organization. That means something to us."

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MAGNETIC RECORDING ADVANCES

(Continued from page 6)

of the early magnetic recorders used ordinary high-carbon steel wire. Such a material has since been shown to have relatively poor characteristics for magnetic recording.

During the past 12 years a number of improvements have been made which have overcome the difficulties encountered by the earlier experimenters. Probably most important of these has been the development of an improved type of recording head in which the recording medium is magnetized longitudinally (parallel to its direction of motion) and in which the recording medium enters and leaves the head in a region of minimum magnetic field.

One of the most important contributors in the design of such recording heads was a young electrical engineering student, Marvin Camras. While a student at Illinois Institute of Technology, Camras designed and built a magnetic recorder incorporating an improved type of recording head.

The principal advantages of this improved head are (1) a much smaller scanning gap resulting in a considerable improvement in high-frequency response, and (2) no appreciable magnetization of the medium as it enters or leaves the head, the medium being magnetized principally at the scanning gap. More recently, longitudinal-type magnetic recording heads have been designed and built which are particularly suitable for magnetic tape and magnetic sound tracks on motion picture film.

H-F Bias, Better Base Media

A second recent improvement has been the introduction of a high-frequency (generally supersonic) bias. With this method of bias a high-frequency sinusoidal signal is added to the audio signal to be recorded. The addition of this signal, when its amplitude is within a predetermined critical range, has the effect of straightening the transfer characteristic in the neighborhood of the origin, making it linear over a much larger range of audio signals. The net result is a considerable improvement in signal-to-noise ratio.

A third improvement has been the development of better magnetic recording media. It has been found that stainless steel, when properly processed, acquires magnetic properties comparable to good quality permanent magnets. Stainless steel wire having excellent characteristics for magnetic recording is now available. Considerable improvement has also been made in the development and processing of fine magnetic powders for use on tape and motion picture film.

The aforementioned developments have made it possible for the first time

to satisfactorily record the sound even on 8-mm film. In 35-mm sound film the optical track is 0.100 inch wide and is

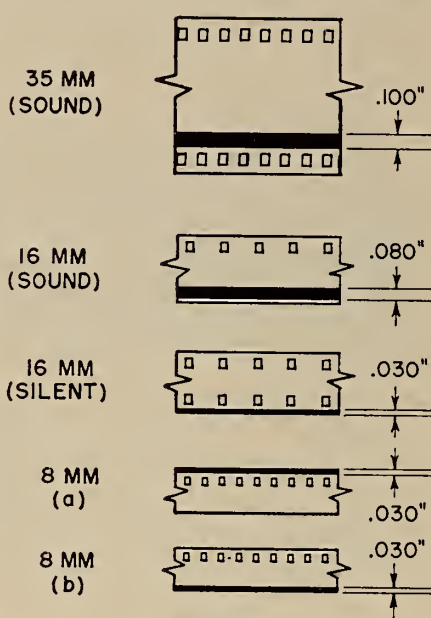


FIGURE 1

Graphic evidence of the tremendous upsurge of magnetic recording is this chart showing the relative sizes and positions of magnetic soundtracks on motion picture film, including the extremely difficult 8-mm size.

well removed from the sprocket holes and edge of the film. This is, of course, necessary for optical recording since uneven development in the neighborhood of the sprocket holes and the edge of the film results in a distortion of the optical track.

A magnetic track can be used instead

of the optical track on 35-mm film. With improved magnetic powders, it is possible to obtain high-quality magnetic records on 35-mm film. Recent experiments have shown that at 24 frames per second it is easily possible to obtain a reproduced signal having a signal-to-noise ratio in excess of 45 db and a frequency response which is flat within ± 1 db from 50 to 16,000 cycles per second.

Sound Track Positioning

For 16-mm sound film the sprocket holes have been removed from one edge of the film to make space for the optical track (Fig. 1). This optical track can be replaced by a magnetic track, or, on 16-mm silent film, the magnetic track can be placed between the sprocket holes and the edge of the film. In either case, at the same film speed, the results are equally satisfactory.

For 8-mm silent film, the sprocket holes already have been removed from one side of the film (Fig. 1). If an optical sound track is to be used on this film, it can be placed either on the unsprocketed side reducing the limited area available for the picture, or it can be placed between the sprocket holes and the edge of the film, in which case troubles are encountered due to uneven development.

Thus, neither of these locations is satisfactory for an optical track. However, a magnetic track 0.030 inches wide, can be placed on the sprocketed side (Fig. 1—8-mm a). Very satisfactory results for the recording of speech have been obtained with a track in this position.

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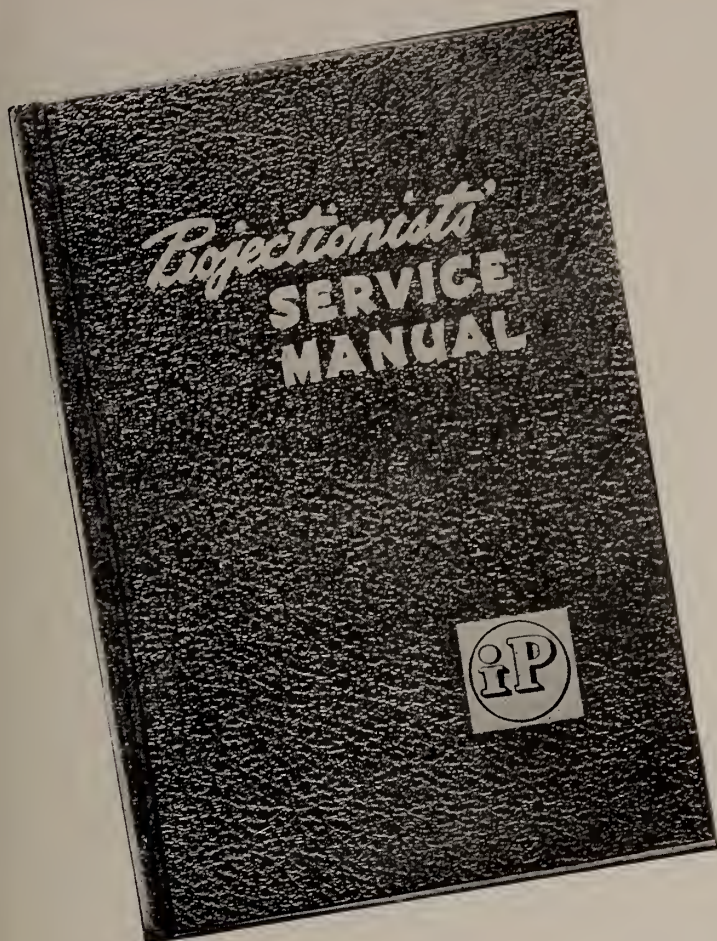
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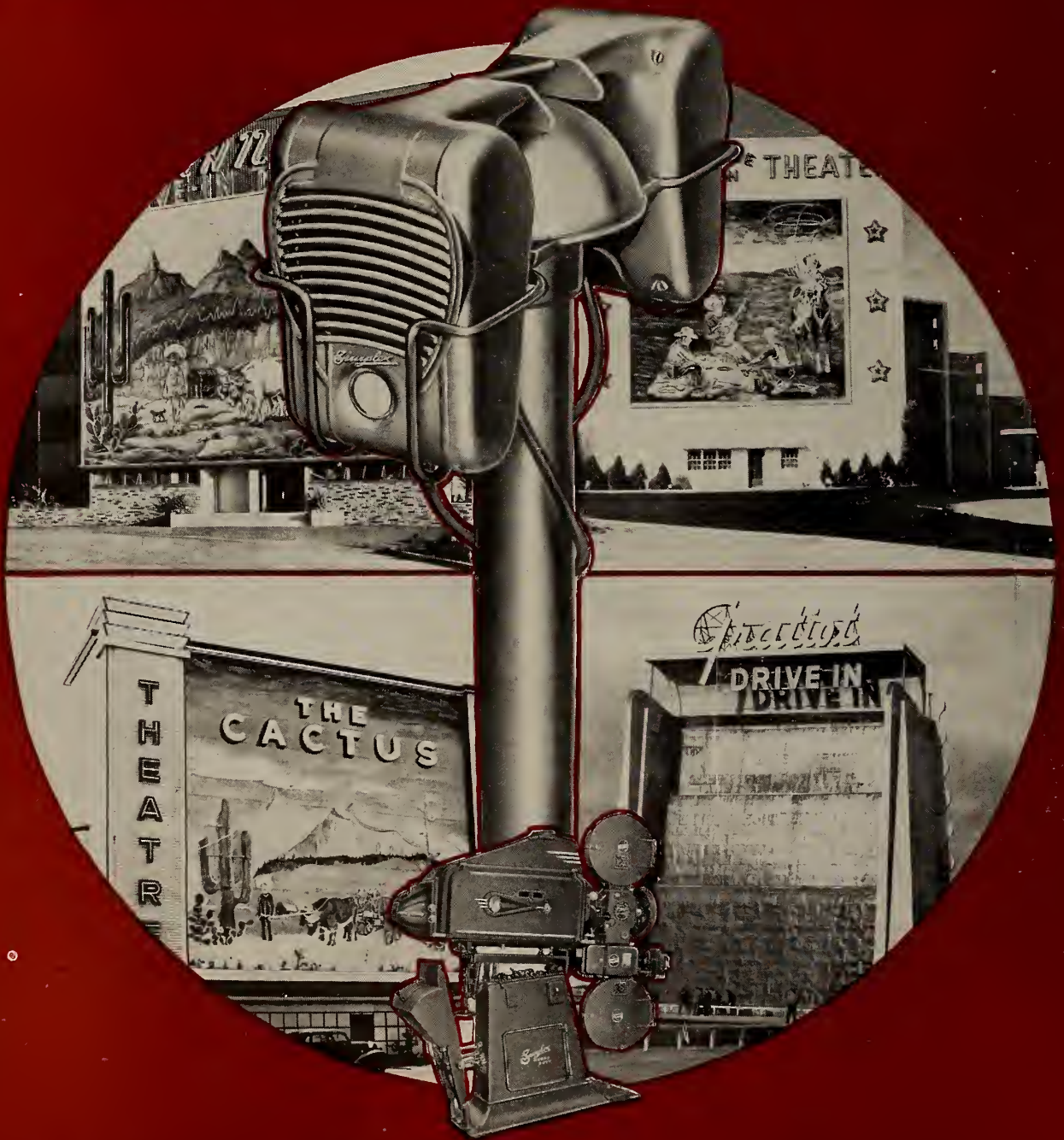
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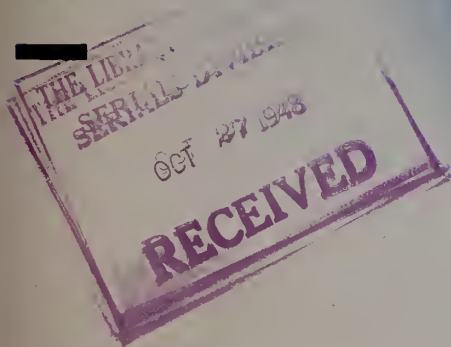
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HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

COMES now a pronouncement by an unquestioned authority on legal matters pertaining to the radio broadcasting and advertising fields to further confound those who labor so assiduously, if brashly, to consummate the marriage of television to the motion picture theatre. This devastating commentary by David M. Sollinger appears in the current issue of the *Columbia Law Review*.

Ignoring the many intricate technical problems involved in such a projected union, Mr. Sollinger bluntly divests himself of the opinion that Tv showings in theatre lobbies, taverns, hotel rooms, dance halls and other public places can be legally stopped, since Tv is protected by statutory and common law copyrights as well as by other common law property rights, "to the same degree as he (a motion picture theatre owner) would have infringed had he reproduced the material on his own stage with his own live cast."

In the case of news events, continues Mr. Sollinger, clear-cut decisions will have to be made as to what constitutes news, since "there can be no private property rights in news as such." Even if sports events are considered news, he adds, public exhibitions of televised sports programs may be restrained by the courts on the grounds of unfair competition. (Not "may be," Mr. Sollinger; they already "have been" restrained—and without a whimper from exhibitors).

Thus is effectively demolished the silly pretensions of those who almost monthly announce the introduction of Tv equipment "for theatre use," whether for large-screen auditorium presentation or for use in lobbies. The bald truth of the matter is that movie theatres may not legally show such programs, whether in the lobby or on the regular theatre screen, to an audience which has paid an admission charge. This naturally introduces the question as to just what program material will be shown via the aforementioned elaborate and expensive units.

Of course, nobody in his right mind will pay admission to a movie theatre to view the same programs that he may view in the comfortable surroundings of his own home—and for free—even if the theatre should hurdle the legal obstacles to such exhibitions. This leaves the matter of TV program material just where it has lain all these many months: right in the laps of the movie industry which has done plenty of jawing but has lifted nary a finger to effectuate the production, distribution and exhibition of showfare made especially for theatre showing.

Our admiration for the marvelous engineering ingenuity reflected by the various Tv equipments made especially for theatre use is boundless; but we shall continue to ask again and again just what useful purpose is served by any equipment which is produced only to remain unused.

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Causes and Prevention of Damage to 35-mm Theatre Release Prints

EVERY year the loss through *needless* film damage runs into staggering sums. Film damage may be caused by various factors, among which are faulty laboratory methods, poor inspection in the exchanges, careless handling in the projection room, and worn or imperfectly adjusted projectors. While it is sometimes difficult to determine the exact cause, each possible source of damage is discussed in the appended compendium.

Also discussed are several beneficial practices which will do much to prolong the life of the film, such as making good splices, methods of lubrication of release prints, directions for determining the correct tension of projector parts and for making other projector adjustments.

The base or support of motion-picture film, which is of standardized thickness, is made from cotton and with reasonable care will fulfill the requirements of general commercial use. However, consideration should be given to the fact that film support has physical limitations. Eastman Kodak Co., with its years of experience in the manufacture of motion-picture film, quite naturally observes every possible precaution to assure uniformity in the quality of its

product. Samples from all coatings are thoroughly tested for their photographic and physical properties and must pass careful scrutiny of trained inspectors.

The matter of accurate perforating is of the utmost importance and is accomplished only by constant vigilance on the part of experts to keep the perforating machines at the highest degree of precision.

[Positive film used in the making of 35-mm release prints for projection is slit and perforated in accordance with the American Standard for 35-mm Motion Picture Film—Cutting and Perforating Positive Raw Stock; ASA Z22.36-1944. The rectangular shape of the perforation has been used for a number of years because prolonged practical usage has proved that it greatly increases the wearing property of the film.]

LABORATORY PROCEDURE

Improvements in equipment and methods of manipulation in all the important laboratories have reduced the possibility of affecting the physical properties of the film during the printing, developing, and finishing operations. However, special attention is drawn to the importance of lubricating new prints along the perforations to prevent unsteadiness and premature breakdown.

FILM LUBRICATION—One of the chief

ingredients of the light-sensitive emulsion of motion-picture film is gelatin—a substance which is hygroscopic and readily absorbs or gives up moisture to reach equilibrium with the prevailing atmosphere. The gelatin in freshly developed film contains a considerably higher percentage of moisture than that in seasoned film. When it is in this condition it is easily affected by heat, which tends to make it soft and tacky, particularly in a moist atmosphere.

The first point at which new film comes in contact with high temperature is at the aperture of the projector. Here the light is concentrated and produces heat to a degree which softens the gelatin and causes it to collect on the tension springs or shoes where it rapidly dries and forms a flintlike deposit.

As the new film is projected the hardened deposit of gelatin continues to accumulate and offers further resistance, so that scratches are caused along the perforations. As the resistance increases there is the added danger of the teeth of the intermittent sprocket tearing and damaging the perforations, sometimes to such an extent that the print is irreparable.

Careful lubrication produces, under the action of heat, a smooth and polished surface on the gelatin along the perforations. It also provides against undue straining during the first projections of new release prints, materially benefits successive runs, and greatly prolongs the useful projection life of the prints.

A very slight lubrication is all that is necessary, and it is best accomplished by a machine which deposits a thin layer of lubricant either along the perforations

This comprehensive compendium of fundamental information applicable to practically all types of projection equipment was prepared especially for the projectionist by the Research Laboratory of Eastman Kodak Co. Recognition of those factors cited as responsible for film mutilation and adherence to the suggested procedure for its prevention is a basic requisite for and should be a chief concern of professional projection work.

or over the entire film surface. New prints treated in this manner require no further lubrication.

THE EXCHANGE PROCESS

Investigation of the general procedure in the inspection and repair of prints indicates that a considerable proportion of print damage may begin in the film exchange. It is not so much that the exchange *starts* the damage as that *it fails to stop it*. Inspections are sometimes too rapid to be thorough. Splicing, if carelessly done, will frequently result in the films being sent to the theatres in such poor condition as to be unable to withstand ordinary projection and rapid rewinding.

Careful inspection and repairs in the exchange result in better service to the exhibitor. They also eliminate theatre breaks which are a frequent cause of film damage, reduce the amount of replacements due to breakdown, and make the film subjects constantly available for service. Longer commercial life means increased earning capacity.

INSPECTION OF RELEASE PRINTS—In nearly all exchanges inspectors run the film between their thumb and finger (protected with a soft cloth or cotton glove) to feel for splices and torn edges. If this is done carefully without cupping the film too severely, no damage is done. If the film is cupped so that a running kink is formed, it may crack or split the film, especially release prints which have had repeated projection or which have dried out due to storage at low relative humidity.

Prints are usually run through a cloth to remove dirt and oil. This is likely to result in scratching the film due to the accumulation of dirt particles on the cloth, and the oil is merely spread over the film rather than removed. This practice should be discouraged except in extreme cases, and particularly with new prints which are more easily scratched than films which have been run. If it should be necessary to remove surface dust from a new print, this should be done with clean, short-nap, silk plush held carefully in the hand.

All release prints should be cleaned at intervals with carbon tetrachloride to remove dust and oil which may adhere to the film from the projector. Standard film cleaning technique serves the dual purpose of cleaning and waxing or lubricating in one operation. The film is rewound by slowly drawing it through a cotton or silk plush pad which is moistened with a 0.03% solution of carnauba wax in carbon tetrachloride. The pad can be folded over the film and held in the left hand while the right hand is used to operate the rewind.

The operation should be carried out

slowly so that the carbon tetrachloride adhering to the film can evaporate before the film is wound. Work done with carbon tetrachloride should be performed in well-ventilated rooms, as fumes of carbon tetrachloride are toxic if inhaled.

In rewinding, care should be taken to see that the rewind is properly lined up so that the film will feed smoothly and squarely from one reel to the other. In this manner a smooth roll is wound with no turns or convolutions of the film having protruding edges. Such exposed edges may be damaged in shipping, and may cause a break during projection. Cinching will occur if an attempt is made to tighten the roll by pulling on the outer lap of film. This practice should be avoided because both sides of the film will be scratched.

SPLICING—Splicing, whether done in the film laboratories, film exchanges, or projection rooms, has such direct bearing on the welfare of the film as to call for special and constant attention.

Much film is ruined by poor splicing. Splices that are wide, stiff, buckled, or out of line cause the film to jump the sprockets so that torn perforations or breaks result. Perforations in the vicinity of a splice of this kind are always strained or broken. Stiff and buckled splices are caused by making too wide a splice, too liberal application of cement, or both. The use of poor quality cement may result in splices pulling apart, especially in the film gate or trap. This constitutes a hazard, therefore all weak splices should be remade before projection.

Precision splicing equipment is desirable as it is difficult to make a good splice unless the scraper is accurately guided. However, it is important that the splicer, regardless of type, be kept in the best possible condition. Fresh cement, proper scraping, and sufficient pressure are absolutely essential for making satisfactory splices.

REELS—Bent reels and those with loose and sharp-edged flanges cause nicks and tiny cuts in the edges of the film which may result in subsequent breakage. The use of defective reels causes untold damage in the rewinding operation. This is especially true if there is a sharp point on the flange that might cut the edge of the film on each turn of the reel. Damaged reels should be discarded.

SHIPPING CASES—Metal shipping cases frequently become bent due to rough handling so that the reels cannot be inserted or withdrawn except by force. This causes broken film edges on poorly wound rolls. Damaged cases should be immediately repaired or replaced.

THE PROJECTION PROCESS

Good projection is entirely dependent on the skill of the projectionist and the condition of the film and the projector. Through constant use projector parts become worn and out of adjustment. Replacement parts for the most part are inexpensive, and any such expenditure will improve projection and materially reduce unnecessary film damage.

When film is damaged on a projector, it is usually due to one or more of three different causes: namely, sprockets, idlers, and tension exerted on the film by the springs in the gate or film trap.

While it is true that in most cases the trouble can be traced to one or more of these points, it must be admitted that the direct cause of a great amount of film damage is never definitely settled between the film exchanges and the projectionists, especially when the projectors in question have been examined carefully and have been found to be apparently in good condition.

In cases of this kind, it is only natural to assume that the film stock is at fault. There are, however, various projector parts, generally considered more or less

THE PROJECTION STAFF AT THE ODEON LEICESTER SQUARE THEATRE, LONDON



Members of the projection crew shown examining the film after the successful first showing of the British-made feature, "Hamlet," at the Odeon Theatre. Left to right: R. W. Greenwood, J. Lawes, J. H. Garnham, R. Pointer, F. H. BurrIDGE, and F. E. CawlinS, chief projectionist.



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But handling supporting actors is only one of many ways the assistant director daily demonstrates his sense of the dramatic and his organizing skill. He is liaison man between his director

and the cast and crews. He prepares shooting schedules... assigns calls... anticipates every need that might arise.

Thus the difference between efficient picture making and a film that goes beyond its schedule and budget often rests with him. Yet heavy as his responsibility is, it's lightened not a little by the faithful performance of a "partner" in efficiency—the famous Eastman family of motion picture films.

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unimportant, which as a rule receive no great attention by the projectionist. The result is that film trouble is likely to start at any one of them.

The appended resume covers the more important points which must be given careful attention by the projectionists if the maximum wearing qualities are to be obtained from the film.

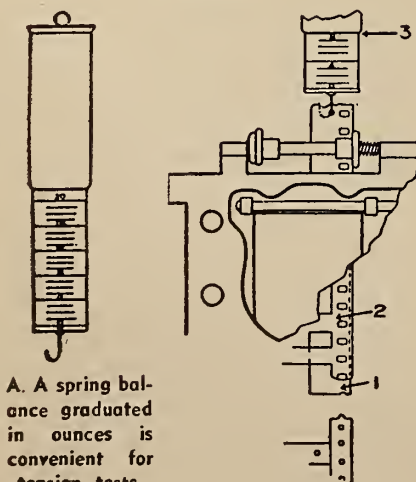
TENSION IN SPRINGS IN GATE OR TRAP—One of the principal sources of trouble is excessive tension exerted on the film by the springs in the gate or trap. A great variation will be found in tension on various projectors being used. Moreover, some projectionists are not familiar with the amount of tension which should be used. As far as is known, there is no generally accepted standard.

The tension springs should be set just tight enough to hold the film stationary at the aperture. This adjustment provides conditions for a steady screen image. The proper pressure will of course depend on the projector used, the length of time it has been in service, and the type of surface treatment the film has received. Tension in excess of this amount merely results in added film wear. The pressure on the film should be exerted evenly on both edges to prevent an unequal pull-down strain.

The proper method of making a tension test is illustrated in Fig. 1. First, the tension on one side and then on the other is taken by using one half of a strip of film about 8 inches long. This strip is prepared by slitting a piece of new film of average thickness down through the center. Care should be taken to observe that the perforations on this strip of film do not engage the teeth on the intermittent sprocket and are held properly in place by the tension shoe before proceeding further.

The test should be made on a *cold*

FIGURE 1



A. A spring balance graduated in ounces is convenient for tension tests.

B (right) Tension tests are made on each side: 1 is the film, 2, the pressure plate, and 3, the spring balance.

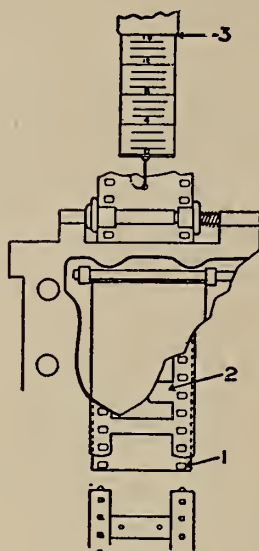


FIGURE 2

A tension test is then made on both sides: 1 is the film, 2 the pressure plate, and 3 the balance.

projector to insure uniformity. After fastening the end of the strip of film to the balance, a straight, even, upward pull is made until the film just starts to move. Tension springs should be adjusted so that both sides are equal.

The combined tension of both sides may be checked as shown in Fig. 2. A full-width piece of film is placed in the gate so that both sides of the shoe hold it firmly against the aperture plate. After making sure that the perforations on this strip of film are not engaged by the sprocket teeth, proceed as before with a straight upward pull until the film just starts to move.

The majority of present-day projectors should give a steady screen image with comparatively low trap tension. Tests made over a long period in the Kodak Research Laboratories indicate that with most projectors a tension in excess of 16 ounces (a total of 8 ounces for each side) only increases the wear on the film.

The design of some projectors permits satisfactory projection with as little as 6 ounces tension, so that a satisfactory range between 6 and 16 ounces is recommended; the amount of tension depends upon the projection equipment used. It is always advisable to test new projectors before film is run to make sure that the tension is not in excess of the recommended level.

The tension springs on some projectors can be regulated by means of small set-screws. When no adjusting device is provided, the springs must be bent by hand and great care must be taken to make the proper adjustment, making certain that both sides are adjusted equally.

SPROCKETS—Through carelessness and neglect sprockets are frequently left on projectors until the teeth develop bad hooks and knifelike edges. Film damage caused by undercut teeth is unmis-

takable in appearance, and in many cases film is practically ruined after one or two showings if it is run on a projector equipped with such sprockets (Fig. 3).

An intermittent sprocket must be changed with great care, as the shaft can be bent very easily. This replacement should be made by someone thoroughly familiar with this type of work. In some cases it may be advisable to have the work done at the factory to insure the best results.

Before new sprockets are placed on projectors, a careful examination should be made of the teeth to be sure that none of them have been damaged by coming in contact with one another or with some hard surface. If a sprocket is accidentally dropped on the floor, the teeth are likely to be burred, and if such a sprocket is used on a projector it may cause untold damage to film. This is true even if *only one tooth* has been damaged.

ADHESION OF EMULSION TO SHOE OR FILM TRACKS—All new film, unless previously lubricated at the laboratory, should be waxed or lubricated to insure against adhesion or sticking in the gate or trap of the projector. If new unwaxed film is run, it is necessary to clean the shoes frequently; otherwise the accumulation of hardened emulsion on the shoes acts as a holdback and causes a greatly increased pull-down strain, which always results in mutilated perforations. Needless to say, a new print can be completely ruined in this manner at one showing.

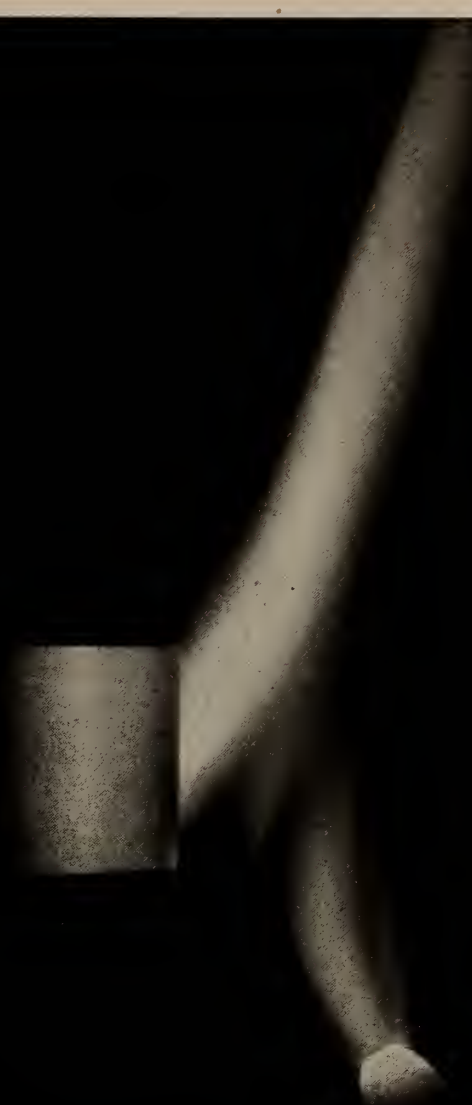
In removing the hardened emulsion deposits from the film tracks and tension shoes, do not use a steel or iron implement such as a screwdriver, safety razor blade, or file. Use a damp cloth, or a moistened orange stick, or if necessary a coin, as this will not scratch the highly polished surface.

GUIDE ROLLERS—The rollers located



FIGURE 3

Sprockets are a prime source of film mutilation. The examples shown here were taken from projectors actually in daily use. Sprocket A is new.



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above the gate or film trap are there for the purpose of properly guiding the film down past the aperture to the intermittent sprocket. If these rollers are out of line with the sprocket, the teeth will engage the film perforations off-center.

On some projectors these rollers are adjusted by means of a collar and set-screw, while on others there is no regulating device. Certain manufacturers using the latter type rely on the proper centering to be made at the factory. Nevertheless there are times when an adjustment is necessary. It is important that great care be used in lining up the guide rollers with the intermittent sprocket, as damaged perforations will result (Figs. 4 and 5).

If these rollers bind, the faces of the rollers will develop ridges which may roughen the edge of the film. It is also well to examine new rollers closely as in some cases they may be received from the factory damaged in transit and have uneven or burred faces against which the edge of the film comes in contact.

FRICTION TAKEUP—The take-up adjustment should be checked closely from time to time. An excessive pull can always be detected by a "singing" sound made on the film at the takeup sprocket. The sprocket, of course, acts as a hold-back or brake and puts a strain on the film, especially when it is started on a reel having a small hub. This is sometimes enough to cause severe damage to the upper edges of the perforations. Fig. 6 shows the sprocket damage resulting from excessive takeup tension.

TENSION ON UPPER MAGAZINE SHAFT OR SPINDLE—Proper adjustment of the spring tension on the upper magazine shaft or feed spindle is important. If it is set too loosely, the film will come from the feed roll too fast or with a jerky motion. This is especially noticeable if a bent reel is used; this is bad for any film and particularly for film which is in a dried-out condition or badly worn.

If the tension be too tight, the effect will not be noticeable on a full reel of film, but the tension on the last 50 or 75 feet will be sufficient to cause serious perforation damage when a small hubbed

reel is used. It is possible for the film to break under this strain.

SPROCKET IDLERS—All sprocket idlers must be properly adjusted. If they are set too far from the sprockets, the film may jump out of place and ride over the teeth. If they are set too close, they will ride the film and cause creasing, especially on the lower sprocket, which acts as a brake on the friction takeup.

The small lock nuts on all idler adjusting screws should always be kept tight. Failure to observe this rule allows the idlers to drop, resulting in creasing and weakening or permanently marking the film.

It has been found that the safest distance to set an idler from a sprocket is the thickness of two pieces of film. Some manufacturers recommend the thickness of one piece of film, but this is insufficient as the distance between the sprocket and idler is too small to allow the average splice free passage. When properly adjusted, it should be possible to move any idler from side to side without danger of binding against the sprocket teeth. Badly worn idlers mark the film and should be replaced.

INTERMITTENT FILM GUIDE—The intermittent film guide is for the purpose of holding the film snugly against the intermittent sprocket. Filing the openings in the film guide holders is sometimes necessary to insure the proper amount of side clearance for the sprocket teeth. Moving the film guide from side to side while the projector is running will determine whether or not the teeth have sufficient clearance.

Figure 7 shows the results of the wearing of the teeth against the wall of the guide, so that sharp edges are developed which cut into the film, especially if the film is improperly guided into the trap.

Many projectionists have found it advisable to substitute a slightly lighter film guide holder spring for the stiff one furnished with some of the older projectors. This change reduces the strain and permits wide or stiff splices to go through with greatly decreased resistance, thus lessening the chance of film breakage.

INTERMITTENT MOVEMENT—One of the

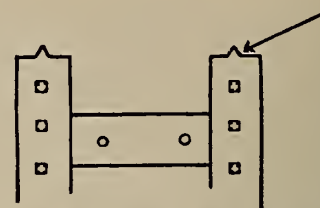


FIG. 7. The arrow shows where the teeth have been grooved to a knifelike sharpness by coming in contact with the wall of the film guide. This ruins film.

main reasons for picture unsteadiness is an excessive amount of play between the moving parts of the intermittent movement due to wear. Readjustment is made by means of an eccentric bearing, but care must be taken to see that it is not set so tightly that the parts will bind. Some projectors provide for a side adjustment of the intermittent shaft by means of a collar and setscrew. Proper alignment is necessary to insure against the intermittent sprocket striking the film perforations off-center.

Excessive wear of the pin-cross type of intermittent movement results in flat sides on the pins; this causes a slightly quickened pull-down which gives an added strain on the film perforations. On newer models these pins are equipped with rollers insuring smoother operation.

PROPER ALIGNMENT OF UPPER MAGAZINE—One of the older projectors provides for an adjustment of the top magazine to allow for its proper alignment. Unless care is taken to see that the magazine is in line, the film coming from the valve rollers will not feed squarely under the idler roller. Improper alignment of this type causes film to crack from the perforations to the edge of the film. This improper alignment also causes film breaks resulting from film with nicked edges and from loose splices coming in direct contact with the side of the valve.

FILM LOOPS—Excessively large upper and lower film loops are noisy. Moreover, a large lower loop will allow the film to drag in any oil which may be present below. The film also has a tendency to jump the sprockets: this can take place if idlers are set too far from the sprockets. On the other hand, if the loops are too small, the perforations may be damaged.

FILM TRACKS OR TRAP SHOES—Many scratches are caused by worn film tracks, or trap shoes as they are known, on one of the projectors. The worn shoes allow the face of the film to scrape against the recessed aperture plate. Such tracks or trap shoes, together with all tension shoes or door pads that show a "wavy" or badly worn-down surface, should be replaced.

FIRE OR VALVE ROLLERS—The valve rollers of both magazines should always

(Continued on page 34)

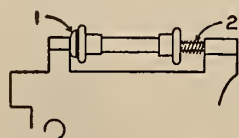


Fig. 4. This guide roller is not adjustable. Spring 2 is designed to hold it snugly against the washer, 1. If improperly aligned, the film perforations will be engaged off-center, and the head should be returned for adjustment.

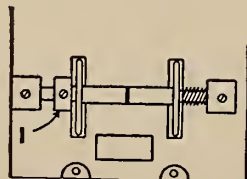


Fig. 5. This roller may be adjusted by loosening the setscrew in collar 1 and then, after centering, tightening the screw. Care should be taken not to "spring" the shaft.

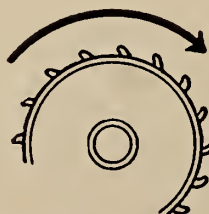
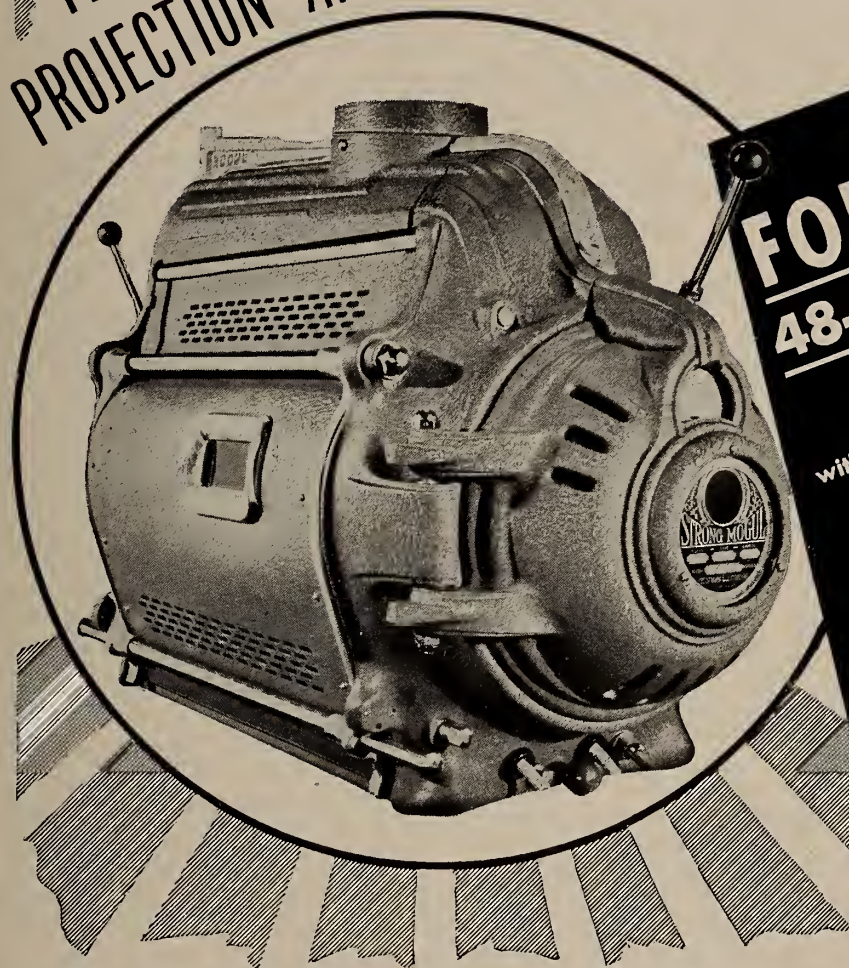


Fig. 6. The teeth of this sprocket have been undercut because the takeup was too tight. Adjustment should be made frequently.

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TELEVISION: How it Works

By WILLIAM BOUIE

The fourth in a series of articles on television image propagation and reception, as based on a chapter in a book by the same name published by the John F. Rider organization.

WE are now in a position to consider more fully the nature of the signal which is used to transmit the Tv image. Up to this point we have explained in a general way that this signal contains the electrical image of the scene being televised and also the information required to synchronize the scanning at the camera tube with that at the picture tube. We will now consider in detail the structure of this signal.

It will be helpful in understanding the nature of the Tv signal to review briefly the audio signal used in sound broadcasting and later to compare the two. In Fig. 16 (A) is shown a typical sound or audio signal. The amplitude of this audio signal represents the intensity (loudness) of the sound, and the number of cycles per second represents the frequency (pitch) of the sound.

During periods when the sound intensity is zero, the amplitude of the sound wave is, of course, zero; on the other hand, during periods when the sound intensity is high, there will then be a proportionate increase in the amplitude of the signal.

An important characteristic to be noted is that in a sound wave the amplitude of the wave has both positive and negative peaks and extends equally in both directions from the zero axis.

Video Signal Characteristics

A typical video or picture signal—that is, the electrical signal which represents the variations in brightness over the elements of a scene—is shown in Fig. 16 (B). The horizontal line in the left-hand portion of the signal shown represents the signal voltage produced by *unlighted* or *black* portion of the scene, which is called the “black level.”

In discussing video signals, this black level is used as a reference from which the light values corresponding to all other signal voltages are measured. The reason for this is apparent from inspection of the rest of Fig. 16 (B), which represents various signal voltages corresponding to parts of the scene reflecting varying degrees of brightness.

Note that as the brightness of the scene increases from black, the voltage of the video signal decreases, and that in any case the picture brightness never results in a signal voltage greater than the black level. The black level is therefore a suitable reference, because its voltage is fixed and easily reproduced. “White” would not be a suitable reference because the signal voltage corresponding to “whitest white” depends upon

the maximum intensity of illumination available.

A video signal in which the signal voltage decreases (from the black level) as the picture brightness increases toward white, is said to have a “negative picture polarity.” The signal of Fig. 16 (B), as we have seen, is of this type.

Negative Picture Polarity

If we call the black-level voltage zero volt in Fig. 16 (B), all other shades of brightness will produce negative voltages, the whitest part of the scene having the greatest negative voltage. A signal having negative picture polarity is used to modulate the Tv carrier in present-day American practice.

Of course, it is perfectly possible to have a video signal in which the signal voltage increases as the picture brightness increases: in this case the signal is said to have a “positive picture polarity.” In fact, the signal undergoes a reversal of polarity in passing through each stage of the video amplifier.

The important difference between the audio signal and the video signal is that the latter is always located on only *one side* of the black reference level, whereas the audio signal contains variations on *both sides* of the zero-signal level. The video signal is therefore a pulsating

voltage with a d-c component, not an a-c wave like the audio signal.

Let us now consider the video signal in greater detail. Fig. 17 (A) shows the output of the camera tube for two successive lines of the image. At the same time, Fig. 17 (B) shows these two lines as they appear on the scanning pattern or raster. Starting at *a*, the beginning of the field, the beam traces the first line *a-c*: referring to the signal (A), it can be seen that the image is black at *a*, changes gradually to a brilliant white at *b*, and finally changes gradually to black at the end of the line *c*.

During the retrace time *c-d*, the signal level is maintained at a uniform black level as shown by *c-d* in Fig. 17 (A). This “black” interval during which the retrace is carried out is called the “horizontal blanking period,” and the pulse *c-d* is called the “horizontal blanking pulse” or “horizontal blanking pedestal.”

The pedestal performs two functions: (1) it blanks out the return trace so that it will not appear on the screen of the picture tube, and (2) it provides a platform on which the horizontal synchronizing pulse is erected. Note that the second scanning line *d-e-f* is essentially the same as the first line, and again the line is terminated on the signal wave by a blanking pulse *f-g*.

In this way the entire field is scanned and the picture signal corresponding to the light and dark variations of the field is produced.

Signal and Sync Pulses

Previously we showed the video signal without discussing the modifications which must be made in the signal in order to provide the necessary synchro-

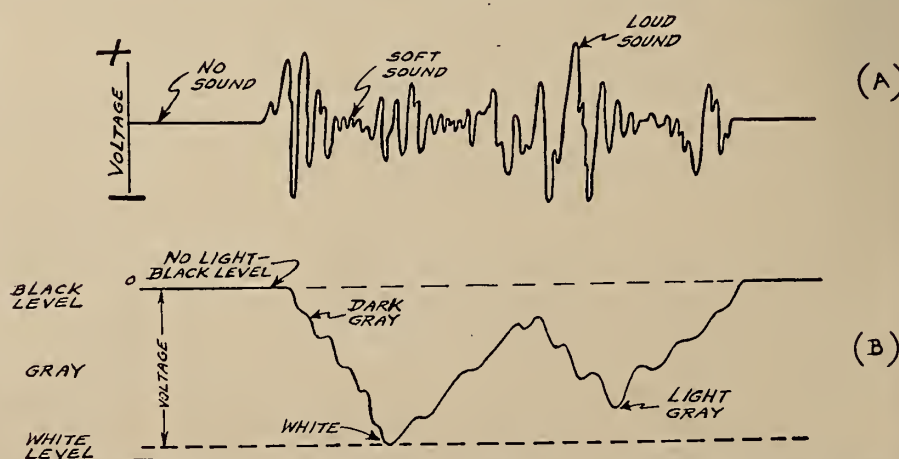


FIG. 16. Comparison between a sound and a video signal. In the video signal, black is represented by a fixed level, and various shades of brightness are represented by voltages displaced proportionately from the black reference level.

nization. We shall now describe how this synchronizing information is added to the signal.

Consider the video wave shown in Fig. 18. This shows the wave for the last two lines of the field, just preceding the vertical retrace period during which the beam returns to the upper portion of the field.

Starting at the left of the figure, the first thing noted is the addition of a pulse which is erected on top of the horizontal blanking pulse: this is called the "horizontal sync pulse." This small rectangular pulse provides the means which keeps the horizontal line or scanning oscillator in the receiver in synchronism with the scanning at the camera tube.

An important thing to note is that this sync pulse is located in the "blacker-than-black" region so that the screen of the picture tube is kept dark during the period of the horizontal retrace. Thus the portion of the signal more positive than black is used for synchronizing information, whereas the voltage more negative than the black level is used for the picture information. It is also important to observe that this line-synchronizing pulse appears at the end of each line so that constant synchronization of the line oscillator is maintained.

Vertical Blanking Period

At the end of the last line at the bottom of the field, represented by point 1 in Fig. 18, the beam is ready to return to the upper edge of the field. As in the case of horizontal scanning, a sync pulse is required to return the beam to the top at the proper instant. All the information associated with the end of the field, required to return the beam to the top of the field in preparation for the one to follow, is contained in the interval designated as the "vertical blanking period."

Essentially, the following three functions are performed during the vertical blanking period:

(1) A field synchronizing pulse is provided so that the beam will be returned to the start of the frame at the proper instant.

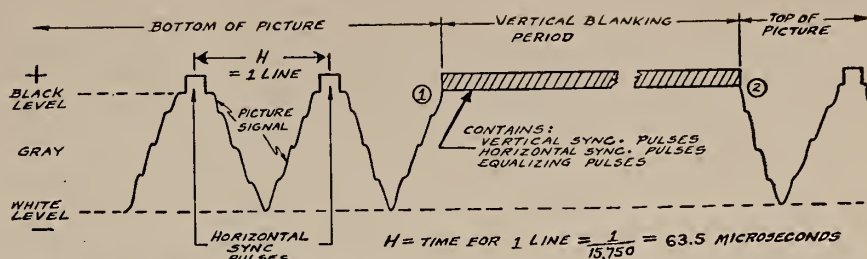


FIG. 18. The video signal showing the last two lines of a field followed by a vertical blanking period. Horizontal sync pulses are shown on the horizontal pedestals, and the vertical sync pulse is transmitted during the vertical blanking period.

(2) The entire signal is blanked out so that the field retrace and lines scanned during this interval will not be apparent to the observer. (Actually, of course, the line-scanning circuits continue to function, but the beam does not exist because of the negative voltage on the control grid of the picture tube during this interval.

(3) The line synchronizing pulses are maintained during the vertical blanking period, which lasts for about 15 lines, so that the horizontal deflecting circuit in the receiver will not slip out of sync during this period.

In addition to the vertical and horizontal sync pulses, two groups of so-called "equalizing pulses" are transmitted during the vertical blanking period; these are required for reasons which will be explained subsequently.

Standard Television Signal

It is desirable at this point to show the complete signal which is used as the standard in the U.S.A. To illustrate the makeup of this signal, Fig. 19 shows the signal for two successive fields in the neighborhood of the vertical blanking pulse. Accordingly, the left-hand portion of (A) shows the last four lines of any one field. This is followed by the vertical blanking period which contains equalizing pulses both preceding and following the vertical sync-pulse interval.

After the last equalizing pulse, the horizontal sync pulses are resumed: by this time the beam has been returned to the upper portion of the screen so that

shortly thereafter the normal video signal is resumed.

To summarize, the first line (A) shows the complete signal as it exists for any one field both before and after the transmission of the vertical blanking period.

Part (B) of Fig. 19 describes the signal as it exists 1/60 second later for the following field. Since the scanning is interlaced, note that the line-sync pulses in (B) appear between the line-sync pulses in (A), thus providing the timing which is essential for interlacing. Again the last line in this field is followed by a vertical blanking period at the end of which the video signal is resumed.

Note that for both parts of the figure, the reference points from which time is reckoned is the beginning of the vertical sync pulse, which is designated as taking place at any time represented by $t = t_1$. Using this time reference, it follows of course that the vertical sync pulse for the next field must begin 1/60 second later (since there are 60 fields per second): this is shown by part (B) of the figure so that the two vertical sync pulses are directly below each other but 1/60 second apart in time.

Horizontal Blanking, Synchronization

As shown in Fig. 19, the horizontal sync signal is transmitted at the end of each line and consists of an essentially rectangular pulse erected on the horizontal blanking pedestal. The amount of time allowed for the blanking pedestal is specified as 15% of the total time from the beginning of one line to the beginning of the next line.

Since the time for each line (including the retrace) is 63.5 microseconds (1/15,750 second), the time devoted to horizontal blanking is about 9.5 microseconds. This interval of 9.5 microseconds has been found to be just large enough to allow for the retrace time, to allow the spot to assume normal scanning speed at the left edge of the picture, and to maintain reliable synchronization.

The whole of the horizontal blanking interval is not utilized for the synchronizing pulse, as may be seen by examining the enlarged view of the wave

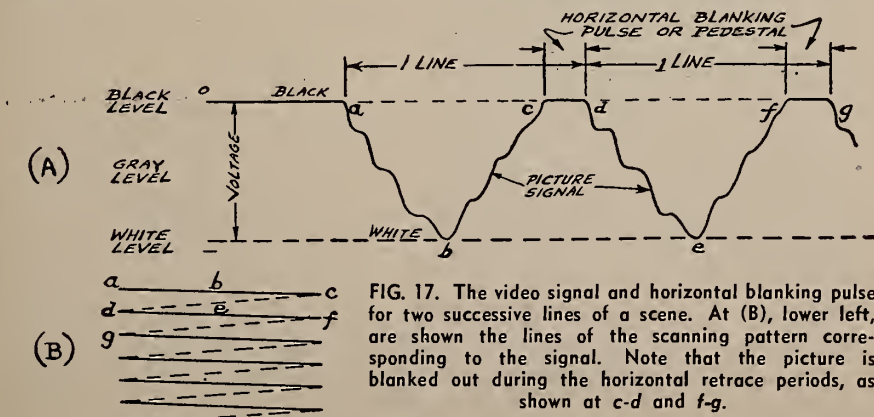


FIG. 17. The video signal and horizontal blanking pulse for two successive lines of a scene. At (B), lower left, are shown the lines of the scanning pattern corresponding to the signal. Note that the picture is blanked out during the horizontal retrace periods, as shown at c-d and f-g.

between C-C (Section B) shown in the detail view in Section C. Actually only about half the total blanking time is used, and the front or leading edge of the sync signal is placed as close as possible to the beginning of the blanking pulse. The small allowance which is made takes care of some variation in timing and insures that the sync pulse will not run into the video portion of the signal and thus upset the line timing.

Vertical Blanking, Synchronization

The vertical blanking interval follows the last line of each field and consists of the following four parts, considered separately:

(1) Six equalizing pulses one-half line apart precede the sync pulse and accomplish (a) the maintenance of horizontal or line synchronization, and (b) the "equalization" of the interval preceding the vertical sync pulse so that conditions preceding the vertical sync pulse are identical for alternate fields. The need for these equalizing pulses arises because of the interlacing of alternate fields.

Figure 19 shows that the lines in the

second field (B) are interlaced with those of the preceding field (A). If the equalizing pulses were eliminated and the vertical sync pulses were inserted in (A) at the end of the last line, then the vertical sync pulse would have to appear in the next field (B) at the middle of the line: the reason for this is that 1/60 second later the beam is in the middle of the line because of the interlacing.

Thus, without the equalizing pulses, the conditions preceding the vertical sync pulse would be different for each of the two fields. This would tend to produce a different type of vertical sync pulse for alternate fields, upset the synchronization and give rise to the distortion known as "pairing of the interlace." In a paired interlace the even-scanned lines do not lie midway between the odd-scanned lines, because of the difference in timing on alternate fields.

In connection with the maintenance of line synchronization during the vertical blanking interval, note that the leading edges of the equalizing pulses function to maintain synchronization. Not all the pulses are used for each field, however.

Thus, note that because of the interlacing the first, third, and fifth equalizing pulses are used on the first field (A), and the second, fourth, and sixth pulses are used on the succeeding field (B).

This explains why six pulses are used, each spaced one-half line apart, rather than three pulses spaced one line apart. It would be possible, of course, to use three different pulses in each field, but if this were done the signal preceding the vertical sync pulse would be different for succeeding fields and there would be a resultant absence of equalization.

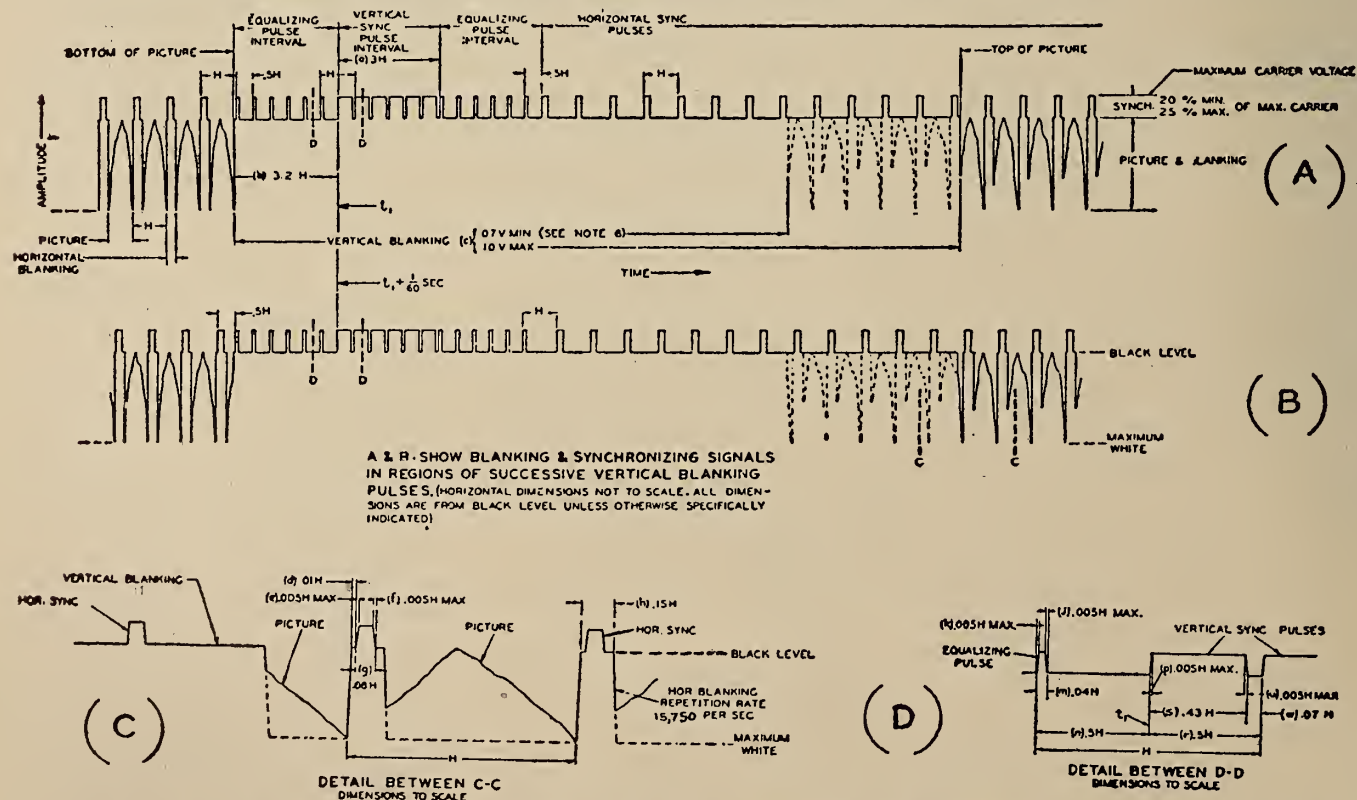
Vertical Sync Pulse

(2) The vertical sync pulse (or field synchronizing pulse) follows directly after the equalizing pulse interval and consists of six broad pulses in which the edges are serrated or cut at one-half line intervals. The function of the vertical sync pulse is to provide the control signal which tells the vertical oscillator that it is time to begin the retrace and thus to return the beam to the top for the beginning of the next field.

The pulses in the vertical sync-pulse interval are considerably broader than

SYSTEM SHOWN HERE REFLECTS THE AMERICAN STANDARD OF 525 LINES AND 30 FRAMES-60 FIELDS PER SECOND INTERLACED

FIG. 19. The standard television signal. Part (A) shows the signal at the end of any one field; part (B) shows the signal at the end of the next field, 1/60 second later. The difference between the two fields is caused by interlacing.



1. Diagram C shows enlarged detail view of signal in view B between lines C-C.
2. Diagram D shows enlarged detail view of the sync signal in view A between lines D-D.
3. H-time from start of one line to start of next line = $1/15,750$ second.

4. V-time from start of one field to start of next field = $1/60$ second = $262.5H$.
5. Leading and trailing edges of both horizontal and vertical blanking pulses have slopes (not indicated in A & B) which should be kept as steep as possible.
6. Receiver vertical retrace shall be complete at end of .07 V.

the line pulses, so that the sync separator circuit will be able to distinguish between the two types of pulses and thus be able to separate the vertical sync pulses from the horizontal sync pulses. At the same time the edges of the serrations at half-line intervals provide the necessary control for maintenance of horizontal synchronization.

The serrations are required at half-line intervals because of the interlacing; the reasoning used in connection with the equalizing pulses also applies here.

(3) It was explained previously that in order to provide identical conditions for the two successive fields preceding the vertical sync pulses, six equalizing pulses were inserted in front of the vertical sync pulse in each field.

It is just as necessary to keep the conditions following the vertical sync-pulse interval the same for the two successive fields (A) and (B): for this reason six lagging equalizing pulses appear in both (A) and (B) after the vertical sync pulse. Examining the vertical sync-pulse interval in both (A) and (B), you will see that although the lines in the two fields are displaced by one-half line because of the interlacing, nevertheless the conditions in the neighborhood of the vertical sync-pulse interval are the same for both fields.

Note that the lagging equalizing pulses are also one-half line apart so that line synchronization is maintained for both the "odd" and "even" fields.

Blanking Period 7 to 12 Lines

(4) The lagging equalizing pulse interval is terminated before the end of the vertical blanking period so as to prepare the line oscillator for the normal horizontal sync pulses which are to follow. In practice, the video signal is blanked out for a period of from 7 to 12 lines following the last equalizing pulse so that the line oscillator (which may have been operating at double line frequency during the preceding period) has a chance to settle down to being under control of the normal type of sync signal.

At the end of the vertical blanking interval the blanking is of course removed, and the video portion of the signal again controls the intensity of the beam in the picture tube.

[To be Continued]

Estimated Movie Gross in 1948

Gross take of U. S. film theatres will approximate \$1,530,000,000 during 1948, according to an estimate by the Internal Revenue Bureau based on a projection to the whole year of figures for the first half. This figure is about 2% less than the record 1947 take, but would be well ahead of 1945 income. Theatres were held to have reached lowest point of their slump during June, with attendance climbing slowly but steadily since then.

20 Years of Theatre Sound System Servicing†

By EDWARD S. SEELEY

Chief Engineer, Altec Service Corporation

The history of the sound motion picture industry is told from the point of view of the service organization. Particular emphasis is given to the part played by the service forces in the steady improvement of sound quality to its present standard. Also discussed are possible theatre problems of the future which national service organizations will help solve.

ON AUGUST 6, 1926, the sound motion picture was officially born. On that date the world premier of the Vitaphone was held at Warners Theatre, New York, the program consisting of "Don Juan" with a synchronized sound-on-disc score and a group of Vitaphone musical shorts. Revolution seized the industry. The equipment companies were besieged with thousands of exhibitors begging for equipment. Many were glad to obtain a nine-month delivery promise. This sudden demand for equipment placed a heavy strain on the principal manufacturers, W. E. and RCA, despite their great facilities.

But the greatest strain was placed on the new organizations whose role it was to install the equipment. These organizations mushroomed. For some time all sources of the required type of personnel were scoured for men of suitable abilities and background at the rate of 75 to 100 per month for one of these organizations alone. Because of the urgent need for men in the field, the training period was all too brief for these men to master the technical mysteries of the sound systems, the mechanics of good installation practices, and the lore of the theatre.

† J. Soc. Mot. Pict. Eng., May, 1947.



Altec's chief engineer Ed Seeley at the controls of the Altec Flutter Bridge which eliminates guesswork and individual "experting" from the evaluation of flutter in film reproduction. This unit permitted the establishment of standards for various types of reproducers.

To add to the burden, it immediately became evident that the new equipment had a perverse tendency to break down when the house was packed with expectant patrons. It was soon apparent that in order to ensure continuous and satisfactory operation it would be necessary to establish an additional corps of trained specialists to service this new complex electrical and mechanical apparatus.

Service Inaugurated in 1927

It was felt that the security of the future of sound pictures depended upon continued satisfactory operation, and consequently in the Spring of 1927 a service department was organized by ERPI in order to maintain the equipment in operation without interference with the high-pressure installation schedule.

The service department gradually emerged from its lowly beginnings and in 1937 became separated from ERPI to be known as Altec Service Corp., with the sole functions of maintaining and improving quality performance in theatres.

Inevitable growing pains were experienced by the young ERPI organization. The new men, rushed into the field to handle sometimes three installations at a time, often without help from their own supervisors, could not achieve completely what we consider the full standard of installation practice, and improper conditions were sometimes left behind them.

The new art of theatre sound projection was growing rapidly and the problem of applying the latest knowledge in the field developed. Furthermore, as the need for new men began to moderate somewhat, it was considered necessary to recontact the field personnel to supply some of the training which it was not possible to give them when the pressure was most intense.

Technical Inspectors Group Formed

To accomplish these several purposes a new group was formed known as Technical Inspectors. These inspectors, selected on the basis of special technical ability, were given more advanced schooling in all parts of the sound systems. They then contacted the installation and service inspectors to further the training of the latter, and made detailed inspection.

(Continued on page 32)

Switches: Projection's Tremendous Trifle

By ROBERT A. MITCHELL

BECAUSE the fundamental purpose of a switch is to perform the apparently simple task of completing and interrupting an electric circuit, it might at first thought seem that any switch, once installed and tested, could be taken for granted and its constructional details forgotten. Not infrequently, however, something goes wrong, and the importance and individuality of that lowly device compel our attention.

Projectionists are not concerned with switches as complex as those that open 100,000-volt power lines under full load, and which may involve a formidable system of motor-controlled relays; but it would be a serious mistake to assume that all the numerous switches in a projection installation are such that deterioration is a negligible factor, or that breakdown never occurs. Switches are the "nerve centers" of the projection setup, hence their functioning is, or should be, a matter of vital importance to the projectionist.

Knife switches are the simplest and sturdiest of all types. A hand-operated knife switch of good manufacture may function for many years without readjustments of any kind or even cleaning, though such extreme neglect is an ever-present invitation to trouble. With the exception of the quick-break variety, knife switches contain no springs, pistons, or delicately hinged pivots—the weakest features of toggle switches.

Relay Switches Complicated

Toggle and snap switches often leave much to be desired in the way of substantial construction and firmness of the electrical contact. The ampere ratings and various seals of approval imprinted on the cheaper toggle switches mean little or nothing at the present time, the electrical trade being flooded with in-

ferior merchandise. Projectionists in small towns can play safe by ordering all electrical items from the theatre supply houses which serve their territory.

Relay switches of the type used for starting motor-generator sets and controlling auditorium lights, footlights, curtains, etc., are more complicated in that they involve an extra circuit and are opened and closed magnetically, but in general they are ruggedly built and rarely give trouble.

Dirt and wear have a telling effect on all mechanical devices, however, and in one instance, at least, a generator was dismantled for overhauling when the real cause of the trouble was a faulty contact in the 3-phase relay switch. By fits and starts the motor of the motor-generator set ran on only two phases! The switch was located in an out-of-the-way corner of the cellar of the theatre, and not a few projectionists had come and gone without ever having checked its condition.

At this point attention is directed to the danger, sometimes ignored, of working on "live" switches which carry high voltages. A 220-volt shock is usually little more than an unpleasantly severe jolt, but occasionally someone "freezes" to the conductors and gets killed. A shock of 550 volts is fatal more often than not. Eliminate unnecessary risks by pulling the 3-phase service switch before working on generator or rectifier relays. To make doubly certain that the relay is "dead," touch the prods of your test-light to each set of contacts.

Cheap Switches Troublesome

Fader switches of the relay type are frequently a source of annoyance. Although it is true that they hardly ever wear out, microscopic accumulations of carbon dust and other dirt on their contact points may cause noisy sound, cross-talk, and even sound outages. The points may be cleaned by drawing a strip of clean writing paper between them. There is a wide gulf between a generator relay and a sound fader, indeed, but the difference serves to remind us that each type of switch is specifically designed for the job it has to do.

Trouble is most frequently experienced with ordinary toggle switches, especially with those which have been unwisely purchased at a dime store or salvaged from a scrap heap of discarded

parts. Numberless instances are on record of vital switches literally falling apart during show hours. It is difficult indeed to comprehend the complacent attitude of those who rely on switches that are scarcely fit even for emergency use.

A variable rheostat, like a switch, is a current-limiting device and is also subject to breakdown. On my first day in a certain theatre all went well until I attempted to increase the generator voltage to its proper value by means of the field rheostat in the generator control box. The arc snapped out very suddenly and the voltage dropped to zero. The rheostat wiper arm had popped completely out of its bearing!

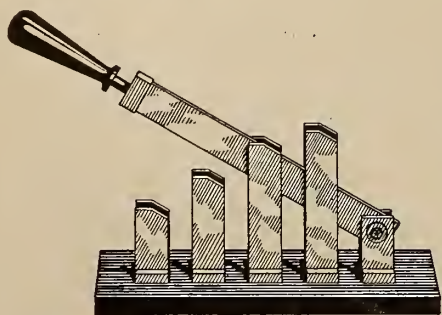
A jumper fitted with battery clips (which I had carried about with me for several years without ever having used it in an emergency) promptly restored the show. A 4-foot length of insulated flexible wire having a storage-battery clip attached to each end is a mighty handy thing for any projectionist to have around.

It is quite all right to make the best of what you have in an emergency, but it is exceedingly risky to replace a worn switch by one of the wrong type. This sometimes happens through pure carelessness. For example, replacement of a motor-generator starter with a standard 2-way (3-way) switch may result in burning out the relay solenoids. Most starters provide electrical contact only during the time that the button is actually depressed by the finger.

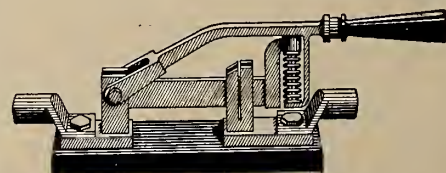
Specific Switch for Specific Job

Incredible though it seems, the wrong type of switch may literally wreck a projector. The following is a case in point: Trouble was experienced during a matinee with the motor switch on one of the projectors, the projectionist finding it necessary to flip the switch several times to start the motor. After the show

(Continued on page 30)



Motor starting switch: sometimes used for starting d-c motors of large capacity. The jaws may be connected to any type of starting resistor, the steps being successively short-circuited as the switch is closed.



Quick-break knife switch: contact blade of this single-pole, single-throw switch is held by the clamping action of the jaws until the handle compresses the spring sufficiently to drive the blade out. The blade leaves the jaws with greater rapidity than in an ordinary knife switch, hence burning of the metal by the arc is minimized.

The BEST in SOUND

was none too good for

JOAN OF ARC

Ingrid Bergman
as
Joan of Arc

RECORDING *Joan of Arc* on Western Electric's new deluxe "400" type sound equipment was in accordance with the producers' conviction that only the best would do for Ingrid Bergman's newest starring film.

Because it gives unexcelled sound quality...because it is extremely versatile and adaptable...and because of its *automatic* operation...the Western Electric "400" is now setting the pace in motion picture sound recording.



*Recording and re-recording
equipment at Hal Roach
Studios used for Joan of Arc*

Electrical Research Products Division
OF
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233 BROADWAY, NEW YORK 7, N. Y.
Hollywood office—6601 Romaine St.

Sierra Pictures Presents

JOAN OF ARC

Starring Ingrid Bergman

A Victor Fleming Production

Producer Walter Wanger
Director Victor Fleming
Recorded by Hal Roach Studios
Recordist William Randall
Released by RKO Radio Pictures
Sound by Western Electric

National Carbon Color Film on Arc For Projectionist Union Showing

CARBON arc projection of motion pictures has been the topic of literally tons of literature in numerous languages, of a mountain of illustrative material and of countless hours of discussion; but it remained for National Carbon Co. to do a sort of double-take and come up with a graphical presentation of the anatomy and behavior characteristics of the carbon arc that communicates more basic information about the art than could a hundred symposiums.

Conceived, produced and edited especially for motion picture projectionists, among whom it will be distributed free of charge, the National Carbon Co. effort is a 16-minute motion picture, entitled "Carbon Arc Projection," filmed in gorgeous Technicolor and which, quite apart from the fact that its content is of such absorbing interest, stands as one of the finest color productions ever made.

It is believed that this picture includes the first motion pictures ever made of the high-intensity arc in operation.

Live Action, Animation Combined

The picture is divided into three main parts of about equal duration. First there is a diagrammatic explanation of the mirror and the condenser optical systems predominantly used at the present time in motion picture projection. Next there is shown a live-action and animated sequence of the operating principles involved and the methods used in measuring the brightness characteristics of the carbon arc. The third section portrays the nature of light itself, and particularly the necessity for a light of the proper color balance for use with color film. This section ends the picture with a unique and color demonstration of the quality of light from the high-intensity arc.

Live action and animation are about equally divided in this film, which is available in both 35- and 16-mm prints. Under no circumstances should either size print be projected with anything but a carbon arc, because the color balance is so finely attuned and so demanding of a perfect light source to bring out its delicately-wrought shadings as to render impotent any light source other than a carbon arc.

There has been to date no graphical interpretation through means of the motion picture of the relationship of the carbon arc to the optics of motion picture projection, nor of the arc's singular position in the broad science of light, sight and color. Since the projection light source is the primary factor in producing

a bright and colorful screen, a motion picture is the ideal medium for this subject, since by its use brightness itself can be used to describe brightness and color itself can be employed to describe color.

So expertly contrived and beautifully executed is this film that it evoked gasps of surprise and appreciation from the group of seasoned technicians, all of whom have been viewing with a critical eye all sorts of motion pictures through the years, which was assembled for the premiere showing in New York.

Although this film was made primarily for the benefit of projectionists and other workers in the art, its superb presentation of basic information makes it a certainty that it will enjoy wide distribution in many other fields, notably among scientific groups and in hundreds of schools and colleges.

A Masterful Color Production

IP regards this film as a masterpiece of its kind and it urges every projectionist group to immediately arrange for showing it to its members. National Carbon Co. will not only supply a print of this film free of charge to any Local Union requesting same, but wherever a large group showing before the member-

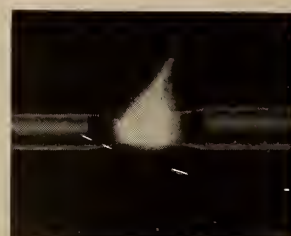
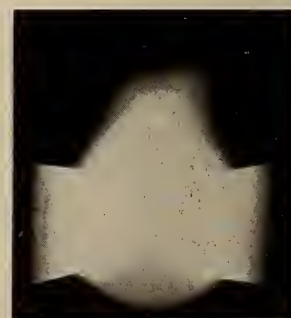
• • •

To Book National Carbon Film 'Carbon Arc Projection'

Requests for prints of this film will be considered in the order of their receipt. Address Erwin Geib, National Carbon Co., P. O. Box 6087, Cleveland, Ohio, specifying number of viewers expected at showing and whether it is for more than one Local in a given area.



Three types of carbon arcs which are most commonly used in American projection rooms: (left) high-intensity, d-c, condenser-type arc with rotating positive carbon; (upper right) high-intensity Suprex a-c arc; (lower right) high-intensity Suprex d-c arc. Both the latter arcs have non-rotating positives and use mirror reflectors.



ships of several Locals can be arranged it will bend every effort to provide one of its field engineers to supply background data and elaborate on any phase of the presentation.

National Carbon Co. will spare no effort to obtain the widest possible circulation of this film among projectionist groups, and it is to be hoped that these organizations will cooperate in such fashion as to justify the really titanic effort that went into the preparation of this motion picture.

The craft is indebted to National Carbon Co. for this enterprise, and National asks in return only the opportunity to screen it for every projectionist in the land.

Canada's 1650 Theatres See Tax Cut Aiding B-O; '47 Profits Up

At the beginning of 1948 there were 1606 motion picture theatres in Canada, 113 more than a year previous, with about 100 film theatres now building.

Famous Players Canadian Corp. is building 18 theatres and is also engaged in an extensive modernization program, one of the largest replacement items being new sound-projection equipment from the U.S.A. No difficulty in acquiring this equipment is being had. This chain's profit in 1947 set an all-time high of \$3,150,000 after all charges and taxes, which was \$320,000 over 1946.

Odeon Theatres, the J. A. Rank chain, opened 5 new theatres in 1947, and 4 more have been added thus far during 1948. This year's end will see 10 additional new units opened, giving Odeon 19 of the "most modern theatres in America". Odeon now owns 107 theatres in Canada and books 31 others.

E. H. Amet, Chicago Film Pioneer, Dies

Edward Hill Amet, 87, a partner of George K. Spoor in the early movie days in Chicago, is dead. He helped found the old Essannay Studios in Chicago, from where many players went on to Hollywood.



TELECASTS

THE whistling-in-the-dark attitude of movie toppers whenever Tv's effect on the box-office is discussed was brushed aside recently in a surprisingly frank statement by Paul Raibourn, Paramount official, before the National Industrial Conference Board meeting in N. Y. City. Raibourn laid it on the line, as follows:

"Motion picture-going decreases from 20 to 30% when Tv sets go into a home." Asserting that this high stay-at-home percentage was subject to revision downward when the Tv set was installed for several months, Raibourn saw small comfort for the movie business in that fact. "A real jolt to those who prattle about Tv's novelty wearing off within a few months is the fact that once the Tv listening habit is established it takes a terrific counter-attraction to get people out of their homes," was the Par executive's summation. Other Raibourn-slants:

Cessation of Spending for Amusement

"We are now seeing inflation causing cessation of spending in recreation and amusement areas, especially in higher-priced elements. Economic change was first felt in night clubs. This change has followed through various high-price elements until it is now reaching lower-cost elements. I place radio and motion pictures in these latter elements.

"Hours of work have gone down since 1850 to a minimum of 35 hours a week, and amusement and recreation now absorbs 30 to 35 hours per week of the 168 hours in the week. It takes 20% of the total income. The motion picture business absorbs but two to three hours out of the 25 given by the average individual to recreation.

"Economically, things commenced slipping 18 months ago. How far this will go may be a political instead of an economic story. The new and major element in the recreation field is Tv, which is the greatest cultural, educational and entertainment medium of the future. When we have a saturation of Tv sets, the demand for other forms of amusement will decrease proportionately."

Use Tv or Fight It—FCC Head

Support for the stand of those who view Tv as "poison" for the movie theatre box-office was seen in the recent address of Wayne Coy, chairman of the Federal Communications Commission before the annual convention of the Theatre Owners of America. Coy warned that exhibitors had better learn to live with Tv and he advised either "cooperation or aggressive, imaginative competition."

Coy stated that the movie industry missed the boat when Tv was still only a gleam in

radio engineers' eyes, and is still missing it. Few movie interests went after channels in the early days, he said, and most available channels are held by radio broadcasters, who also have the bulk of applications pending for more channels.

Pointing out that Tv is putting vaudeville, motion pictures, newsreels, musical comedy and sports events into the nation's living rooms, Coy said: "You are wondering who will stand in the queue buffeted by the wind, the rain, and the snow to see your show when he can see all that without stirring from his easy chair. In the coming battle between celluloid and electronics, you theatre men are going to give your customer's a bigger money's worth than they have ever gotten before—pictures with better writing, better acting, better directing, better photography."

He suggested a study of Tv content and told the movie men they had an opportunity to present local talent, as radio broadcasters have done, and could bring current news to their screens through Tv. Movie houses could use their stages for broadcasting top Tv attractions, and use local Tv stations for advertising current feature films by making the films available for local broadcasting.

"The employment of Tv may well result in making the movie theatre a more creative force and more important community leader than it has been heretofore," said Coy.

Paramount Tv Transcription Offer

Paramount's television transcription service, with no restrictions placed on use of film by purchaser, is announced. Service is aimed at networks, sponsors, ad agencies and package producers. All negatives and prints produced on order become the property of the client, a radical departure from usual custom, and sponsor may make Tv transcriptions available to whatever outlets he wishes.

The system, which makes a 35-mm film recording of a Tv program available within 60 seconds after the program is off the air, has been successfully demonstrated on numerous occasions.

"Paramount recordings are designed to meet the competitive test of theatrical 35-mm pictures," said Paul Raibourn, in charge of Tv for Par. "This means that the quality has to be good when the image is enlarged 117,600 times as it is when enlarged for projection on a screen 18 x 24 feet. When projected to a smaller screen, the quality is even better."

Rates for the service range from a recording fee of \$200 for 10 minutes to \$500 for 60 minutes. Prints on 16-mm film were listed from \$18 for a 10-minute reel to \$108 for an hour-long film; while 35-mm prints are \$45 and \$270 for each 10- and 60-minute show, respectively.



Shown here is the projection room at the Chicago television station WGN-TV, manned 100% by members of Local 110. Reading, left to right: Rowland Long, Elmer Enke, and James Storbuck.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

UNION sponsored health and welfare programs are not of recent origin but date back to the early days of trade unionism in this country. The first agreement calling for these benefits was negotiated back in 1926 by the Amalgamated Association of Street and Electric Railway Employees (AFL) for the employees of the Public Service Corporation of Newburgh, N. Y., and provided for a \$1000 life insurance policy and weekly sick benefits of \$15. It is estimated that at the present time at least 3 million workers in this country are covered by health, welfare and retirement funds. Some of the benefits provided for under these funds cover hospitalization, life insurance, death, welfare assistance, surgical and medical care.

Among the industries covered by these programs are clothing (men's and women's), textiles, construction, machinery (particularly electrical), rubber, paper, furniture, shipbuilding, steel, utilities, fur, leather, cleaning and dyeing, coal mining, commercial telegraphy, and jewelry. Following this trend, several of our more progressive Locals have already adopted similar programs, and we hope the day is not far off when these plans will become an integral part of every union contract.

• Howard L. Straub, treasurer of Local

576, Mansfield, Ohio, for the past 13 years, has served as an officer of the Local for over 20 years. He was the sponsor of the death benefit resolution introduced at the recent IA convention, which, incidentally, went by the boards.

• Pierce N. Bross, sergeant-at-arms for Local 554, Lebanon, Penna., died last month at the U. S. Veterans Hospital in Lebanon. He had been in failing health for some time.

• In its recent annual report to the membership, New York Local 306 Retirement Board stated that 42 members are now receiving pension benefits from the Local. The pension fund treasury now amounts to well over \$100,000.

• Wm. F. Canavan, former International president, observed his 60th birthday last month. The passing years have dealt kindly with Bill, who operates a projection machine at the Shubert theatre in St. Louis. We spent some time with him when we attended the TESMA Convention in St. Louis last month, and we had quite a time recalling the old days.

• George T. Rock, Sr., Local 96, Worcester, Mass., and Mrs. Rock celebrated their 50th wedding anniversary last month. George has represented Local 96 at all IA conventions since 1909, and

if the good wishes of his fellow members mean anything, he will be around to attend many more such meetings.

• In order to keep all his members in touch with the business of the Local, Herb Aller, business agent of Local 659 (Cameramen), Hollywood, Calif., has hit upon a swell idea. Since many of his members are unable to attend the regular union meetings because of their work assignments, Herb sends to each man, no matter where located, a mimeographed letter giving a detailed report of all matters brought up for consideration at the meetings. In this way the members are kept informed of all business transactions. We think this plan merits consideration, particularly by those Locals with a membership scattered over a wide area and who for various reasons cannot attend the regular union meetings.

• Ben Scher, former Brooklyn business agent for Local 306, resigned from office and was voted 6-months' severance pay by the Local. Harry Garfman was elected to serve Scher's unexpired term.

• We missed Larry Cassidy, Chicago Local 2, at the recent IA convention, the first one he failed to attend since 1908. Larry's raspy voice was a familiar sound at all such gatherings, for it was he who always made the motion setting the convention hours.

• IA President Walsh was appointed by the AF of L a delegate to the 63rd annual convention of the Trades and Labor Congress of Canada, which opened in Victoria, B. C., on Monday, October 11.

• We regret to report the passing of another old-timer. Harry Dobson, vice-president and charter member of Toronto Local 173, died several weeks ago in his 55th year. Prior to his recent illness he was chief projectionist at the Odeon Fairlawn Theatre, rounding out a career in show business of about 40 years. Dobson started as a projectionist in the early days when the machines were hand-cranked and a theatre program consisted

FEWER UNITS, UPPED DOLLAR VALUE MARK AMERICAN MOTION PICTURE EXPORTS

TYPE OF EQUIPMENT	JAN.—JUNE 1948		JAN.—JUNE 1947	
	<u>UNITS</u>	<u>VALUE</u>	<u>UNITS</u>	<u>VALUE</u>
Motion Picture Projectors:				
35 mm. Projectors	3,130	\$ 1,315,968	3,330	\$ 1,281,691
16 mm. Silent Projectors	2,825	298,162	3,796	197,621
16 mm. Sound Projectors	4,829	1,395,826	5,405	1,525,109
8 mm. Projectors	4,768	338,769	4,991	233,931
Total	15,552	\$ 3,348,725	17,522	\$ 3,238,352
Other Motion Picture Equipment:				
Sound Recording Equipment	---	1,239,130	---	781,331
Sound Reproducing Equipment	---	1,082,796	---	2,188,533
Arc Lamps for Projection	998	219,150	1,567	414,388
Motion Picture Screens	---	245,838	---	159,359
Total		\$ 2,786,914		\$ 3,543,611

Figures for comparable six-months periods of 1947-48, as released by U. S. Dept. of Commerce

of a 10-minute feature and a sing-song. For many years he served as chief inspector of theatres for the province of Ontario, leaving that post in 1939 to take charge of the Fairlawn Theatre projection room. He had many friends in the industry and was very popular with the Local membership.

- The press showing of the National Carbon Company film, "Carbon Arc Projection," was held last month at the Johnny Victor Theatre (RCA Exhibition Hall) in New York City. Prints of this film, either 35- or 16-mm, are available upon request to all Local Unions, and we urge every Local to take advantage of this offer and write at once to Erwin R. Geib, Manager of the Arc Department, National Carbon Company, P. O. Box 6087, Cleveland, Ohio. A detailed description of the film appears elsewhere in this issue.

- Retail clothing salesmen, members of the Amalgamated Clothing Workers' Union Local 340, New York City, won a retirement fund in the settlement reached between their Local and the employers, in which the employers will contribute 3% of the payroll to this fund, retroactive to January 1, 1948. The 700 members of the union were unanimous in their praise of this settlement, many of them expressing their gratitude for the feeling of security in their old age.

- George W. Vleck, Local 337, Utica, N. Y., has asked us to extend through these columns his deep appreciation and gratitude to his brother IA members, and particularly to those from the 10th District, for their sympathy, kindness and assistance at the time of his wife's sudden death during the Cleveland convention.

- Time marches on. About 32 years ago Eugene J. Atkinson and John O. Aalberg, members of Chicago Local 110, doubled up as partners on a shift job in a dump on Clark Street, Chicago, that passed for a theatre. Today, Gene Atkinson, business manager of Chicago Local 110, is considered one of the most progressive union officials in the Alliance and is credited with being the inaugurator of many benefits now being enjoyed by IA men throughout the country. John Aalberg, on the other hand, has been sound chief for the RKO Hollywood studios for many years and was recently appointed industry coordinator to direct the organization of a motion picture reserve unit for the



John O. Aalberg

U.S.A. Signal Corps. He served in World War II, retiring from active service in 1946 with the rank of lieutenant-colonel.

- George Levasier, member of New York Local 306, who died recently, willed \$1000 to the Local's Pension Fund in appreciation of the assistance he received from this fund upon his retirement from active work. Levasier applied for a pension shortly after reaching his 80th birthday, about one year ago. A plaque commemorating his generosity now hangs in the union's headquarters.

- "Arkansas Red" Story, member of Local 312, Enid, Okla., resigned from his job as machinist with the National Theatre Supply Co. to return to his first love—the projection room.

- John N. Cason, Local 236, Birmingham, Ala., and O. L. (Bud) Williams, Local 144, Memphis, Tenn., stopped off at Oklahoma City to visit with relatives and friends on their way home from a four-months' tour of the West Coast.

- Last month's out-of-town visitors to the offices of IP: Hal Huff, member of Los Angeles Local 150 and manufacturer of the well-known Huff's Orthoscope lenses, carbon coolers, and other



BUFFALO PIONEER PROJECTIONISTS

Holding the banner they carried in the 1910 Labor Day parade are the five men who were instrumental in organizing the first projectionist union in Buffalo, N. Y., then known as Branch No. 4 (today's Local 233). They are, left to right: W. W. Matchette, M. Ostrowski, F. C. Taylor (the first president), L. Hilbert, and J. Gramsa. These pioneers are all employed as projectionists at the Lafayette Theatre, which is better known among Local 233 members as the "Old Folks Home."

projection products; W. Dion, Local 233, Buffalo, N. Y.; Harry Bell, projectionist on the famous British luxury liner *Brittanic*, and Fred Rich, sound reproduction chief for the Greater Union Theatres of Sydney, Australia, who called to say goodbye before leaving on the *Queen Mary* for London.

- We were deeply grieved to learn of the sudden death of our very good friend, Walter J. Kunz, secretary-treasurer of Local 279, Houston, Texas. When we saw Walter at the recent IA convention he seemed to be in excellent health, and the news of his demise shortly after his return home came as a terrific shock to us. A resolution expressing sorrow at the loss of a dearly beloved brother was adopted by the Local, stating "That the Local Union charter be draped for a period of ninety days and that a copy of these resolutions be presented to the family of our deceased friend and brother, and that copies be sent to the International Alliance and to International Projectionist."

The resolution was signed by Eddie Miller, Lucien M. Andler, J. O. Hogue, J. O. Anderson, Chas. A. S. Smith, Frank Mondilla, Lewy Evans, Frank Coogler, J. W. Kramer, H. J. Nelson, E. C. Roseberry, Roy S. Hall, E. O. Branch, and J. J. Vanden.

- The headline "Box Office Returns Exceed Expectations" appeared in large bold type on page 1 of a leading trade paper dated October 11, 1948. And a statement recently issued by Max E. Youngstein, vice-president of Eagle Lion

(Continued on page 29)

Resolutions ADOPTED BY LOCAL 182 International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators of the United States and Canada



ON THE DEATH OF
Past President

Thad C. Barrows

WHEREAS: ALMIGHTY GOD IN HIS WISDOM AND MERCY HAS REMOVED FROM OUR MIDST BROTHER THAD C. BARROWS, AND

WHEREAS: HE HAS BEEN AN EARNEST LEADER AND WORKER IN THE INTEREST OF THE MOTION PICTURE INDUSTRY, AND

WHEREAS: BY HIS DEATH, THE ENTIRE ALLIANCE HAS LOST A LEADER AND PIONEER IN HIS FIELD OF ENDEAVOR AND THEREFORE BE IT

RESOLVED: THAT WE, LOCAL 182, I. A. T. S. E. & M. P. M. O. OF BOSTON, IN MEETING ASSEMBLED, VOICE OUR SORROW IN THE DEATH OF BROTHER THAD C. BARROWS AND WE UNITE WITH THOSE COUNTLESS OTHERS IN THE MOTION PICTURE INDUSTRY WHO JOIN WITH US TO MOURN HIS PASSING, AND THEREFORE BE IT

RESOLVED: THAT WE, AS OFFICERS AND MEMBERS OF LOCAL 182, EXPRESS OUR HEARTFELT GRATITUDE TO HIM FOR THE UNTIRING EFFORTS AND ZEAL THAT HE EXPENDED IN OUR BEHALF, AND, THEREFORE BE IT FURTHER

RESOLVED: THAT WE STAND IN SILENCE IN RESPECTFUL MEMORY OF BROTHER THAD C. BARROWS, AND THAT A COPY OF THESE RESOLUTIONS BE FORWARDED TO HIS FAMILY, THE GENERAL OFFICE OF THE INTERNATIONAL ALLIANCE, AND A COPY BE SPREAD UPON THE RECORDS OF LOCAL 182, I. A. T. S. E. & M. P. M. O. OF THE UNITED STATES AND CANADA.

RESOLUTIONS CONSIDERED
JOSE E. BEEZIAN
ARTHUR TOLLEY
WILLIAM KELLY
JAMES COSTA
JERRY CAPLAN
JAMES F. RICE, Chairman

Joseph Ruggolo, Sec.
President
Bernard J. Lynch
Secretary

Reproduction of a handsomely engraved illuminated scroll executed by Boston Local 182 in memory of Thad Barrows, who served the Union for 30 years.

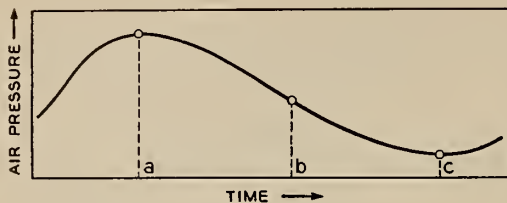
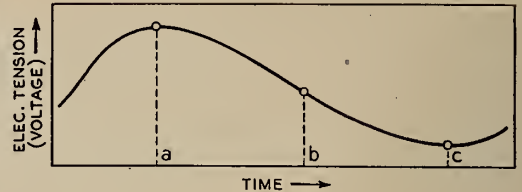


FIG. 1 (left): Sound travels as a succession of air pressures.

FIG. 2 (right): Telephone circuit builds facsimile of air pressure pattern in electrical voltage.



Making Energy Talk

By M. BROTHERTON

Staff Member, Bell Telephone Laboratories

IN TALKING we write words in the air: they travel to the ears of our listeners as meaningful patterns in pressure. Were a sensitive gauge held near a listening ear, the air pressure would be seen to rise and fall through a succession of hills and valleys, hundreds of times a second.

Seen over a minute fraction of a second, the pattern of a word might appear as in Fig. 1. Each word, each sound has its own unique pressure-pattern; this the eardrum records and the mind recognizes, and it is this pattern which all speech communication must take in, transport and deliver.

One way to transport a voice-pattern is to pack it up and send it by mail—on a phonograph disc in which the tell-tale ups and downs in air pressure have been neatly carved out in plastic by a sound recorder. In wire and radio, it is the transporting energy which has to be carved out to convey the pattern. The process of impressing the pattern on the transporting energy is known as *modulation*.

The Telephone Talks With Voltage

In ordinary speech we modulate sound energy. Through the telephone, modulated sound becomes modulated electric current; through radio, modulated radio waves. The several methods of modulating wire and radio energy are, despite their erudite names, simple to visualize when divorced from the intricate electronic technics which put them to work, as may be seen by considering first the

classical example of the everyday telephone.

In a telephone circuit there exists a one-way electric tension or voltage; it remains steady so long as we are silent. As we speak, the transmitter takes in the ups and downs of air pressure and causes the erstwhile steady voltage to rise and fall in unison. In this way, the telephone circuit builds the same pattern as we started with, only now it is in voltage instead of air pressure (Fig. 2).

This electrical pattern passes to the receiver, which, reversing the function of the transmitter, transforms it back into air pressure.

In every sound communication system,

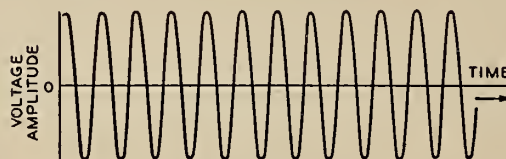


FIGURE 3

Unmodulated radio waves of constant voltage-amplitude and frequency.

no matter how complicated, the very first step is always the transformation of the pressure-pattern into its electrical facsimile; and the very last step is always the reconstruction of that pattern on the basis of information fed to the receiver. With more complicated systems, there is the difference that the signal-bearing energy is usually carried through one or more additional processes of modulation on its way to the receiver.

All of them, however, are simply different ways of signaling this selfsame pattern. One example is radio wave modulation.

Radio waves differ one from another

is tailored to conform to the pattern impressed.

Could these amplitude-modulated waves be seen on their way through space towards the receiver, the procession of crests would present in outline an exact facsimile of the original pattern.

Talking in Wave-Frequency: FM

In interpreting amplitude-modulated waves, the receiver behaves like a voltmeter. For it measures the voltage at each instant, plots the corresponding point with respect to time and so constructs the desired pattern.

In signaling with a beam of light,

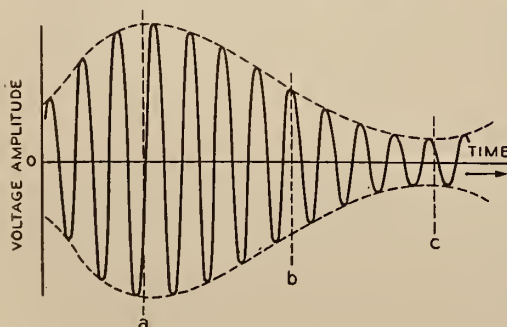
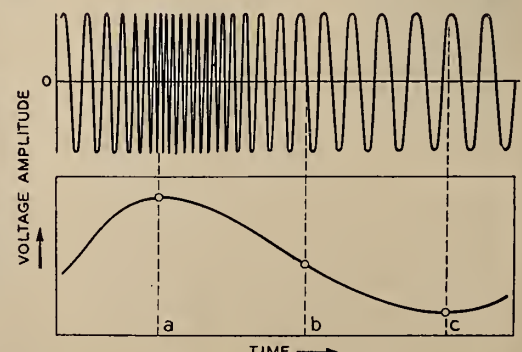


FIG. 4 (left): The amplitude of the waves is modulated to bear the imprint of the pattern in Fig. 2.

FIG. 5 (right): Frequency-modulated waves represent the variations on the pattern by variations in frequency.



information may be conveyed by manipulating either the intensity of the light or its color. Amplitude-modulation corresponds to varying the intensity or amplitude; frequency-modulation corresponds to manipulating the color or frequency.

For example, at instant "a" the frequency-modulated transmitter sends forth waves at a chosen frequency, at "b", waves at another frequency, and at "c" still another (Fig. 5). Each and every voltage on the pattern is represented by a corresponding frequency which remains constant only while the voltage it represents remains constant.

A frequency-modulated wave-train on its way through space would appear to be constant in amplitude, but continuously varying in frequency, and its crest outline would not in any way reveal the essential voltage pattern being carried. To interpret the signals the FM receiver behaves like a frequency meter: it measures each frequency as the waves pour in, plots it with respect to time and so reconstructs the pattern.

Talking in Samples: PM

In the modulation of steady voltage in the everyday telephone as well as in the modulation of radio waves by the amplitude and frequency methods described, the pattern-building signals are transmitted in unbroken sequence so that every point is made available to the receiver for its task of reconstruction.

But we do not need to know every

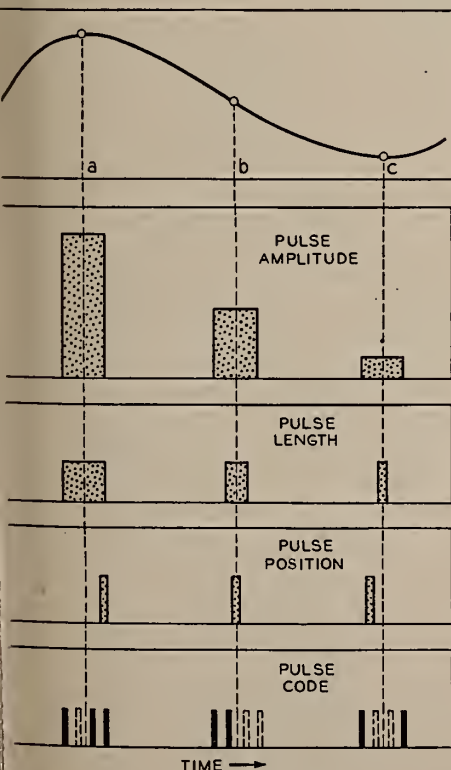


FIGURE 6

Sample-talking through pulse-modulation.

point of a curve in order to plot it. A very few points are enough to define a simple shape like that in Fig. 2, and more are needed only as the pattern becomes more complicated. This fact provides the basis for pulse modulation.

In pulse modulation, only samples of the pattern are sent: these samples are picked off and transmitted at periodic intervals and are sufficient in number per second to define the pattern. Each sample is transmitted as a distinctive signal—a pulse of voltage. And pulse by pulse the receiver reconstructs the pattern. Here, exactly as in ordinary telephone, the information transmitted is also a voltage pattern but its contour is no longer continuous. It consists instead of a succession of rectangular bumps spaced out in time.

Pulse modulation, though usually spoken of in connection with radio, is, in itself, only another method of making energy carry meanings; it is in theory

equally applicable to either wire or radio transmission, and could indeed be applied just as well to carrying voices by sound waves through the air.

Four methods whereby bumps or pulses are made into signal-bearers are shown in Fig. 6, which also shows that each pulse is like a slice of energy carved off in height for voltage amplitude, and again in length for duration. To these energy-slices meanings are given through the manner of their slicing or through their spacing in time.

Talking in Voltage Samples Through PA Modulation—I

In pulse-amplitude modulation the transmitter sends out pulses equal in duration but unequal in voltage or amplitude, each pulse depicting in its voltage a sample from the pattern. Thus, the voltage of the pulse which goes out to signify sample "b" is lower than the

(Continued on page 27)

Motiograph's Latest Drive-In Theatre Sound System

DETAILS of the current model Motiograph-Microphonic 500-watt sound reproducing system designed especially for Drive-In theatres are given in the accompanying illustration and the appended detailed descriptive matter.

Rack No. 1

TOP UNIT: the SE-7555 switching panel. The upper row of switches controls ramp sound feed circuits, while the lower row of switches controls the lighting feed circuits. The red jewels in the middle indicate lighting circuit operation. Note the individual ramp sound circuit monitor switch and speaker above the main control panel.

This unit contains individually-fused transformers for eight lighting circuits and dummy load resistors for eight ramp sound circuits.

CENTER UNIT: the SE-7520 power unit which supplies d-c current to the exciter lamps.

BOTTOM UNIT: two SE-7558 ramp switching panels designed so that the entire in-car speaker system may be broken up into 20 divisions.

Rack No. 2

TOP & BOTTOM UNITS: these cabinets house two 25-watt MA-7505A driving amplifiers. The switch shown on the center unit panel permits the use of either amplifier.

CENTER UNIT: this turntable (Motiograph-built) can play ten 12-inch records or twelve 10-inch records, and it can be arranged by a quick change in the stylus to have this turntable use the new long-playing records (approximately 45 min-



utes) which have five selections on each side.

Rack No. 3

TOP & BOTTOM UNITS: each contains a 250-watt amplifier. Switching facilities permit either one or both of these amplifiers to be used. Actually, one of these amplifiers has sufficient power to drive 1000 in-car speakers, thus the combined system provides enough energy to serve double the usual number of speakers in even the largest drive-in theatre.

CENTER UNIT: this is an AM-FM radio which can be used to supply incidental music through the in-car speaker system.

The aforementioned equipment, supplemented by the SH-7500 sound reproducers, constitutes the complete Motiograph drive-in equipment. All units are built by Motiograph from designs by the ERPI division of Western Electric.

Presenting: Hugh Sedgwick

UP CANADA way there is one of our own projectionists who has held so many labor union offices—local, Dominion and international—that it requires almost half a newspaper column to list them all. A fact. But this eventuality was forecast by the manner in which he became a union man and projectionist—deliberate and as a result of long planning and much hard work.

We're referring to Hugh Sedgwick, secretary and business agent of IA Local 303, Hamilton, Ontario, whose chance reading in 1916 of an item relative to Local 173 in a Toronto newspaper settled definitely his life's work.

His apprenticeship began in a theatre where the manager's son assisted the "operator" but didn't like cranking a projector interminably, so Hugh earned 50 cents per night as his first theatre

He strives mightily
in the Labor
vineyard:

Hugh H. Sedgwick



chore. During the day he worked in a machine shop, his workday running like this: up at 5:45 a.m., at the machine shop from 7 a.m. to 6 p.m., then to the theatre for a 7 to 11 p.m. stint.

Eventually he obtained his license,

joined Local 303 in 1917, and became a full-fledged "operator" at the house where he apprenticed. He lasted two weeks because the manager wanted him to work for \$2 under the scale. By 1923 things were rather rugged, so Hugh played the clarinet in the Strand Theatre orchestra—until the season closed in May, piano alone being used in the summer. Then to the Steel Company of Canada on a 13-hour night shift in the rod rolling mill. Projection work looked mighty sweet by comparison, but it wasn't until 1928 after much playing in bands and selling life insurance that he began work at the Capitol Theatre, where he still is employed—but now as a "projectionist" rather than an "operator."

When Sedgwick first became secretary of Local 303 he bought an Oliver typewriter, but he was shocked to find that the business school he entered taught only on Underwoods, thus necessitating another bite in Hugh's then meager income. He also plays the piano, and has

FOCAL LENGTH OF PROJECTION LENS FOR GIVEN SCREEN SIZE & LENGTH OF THROW

Figures Based on Standard Aperture of 0.825 x 0.600 Inch

Figures in table show actual width of picture in feet and inches. To find picture height, multiply width by 0.73. To determine size of screen, add at least 6 inches to width and height.

LENS FOCAL LENGTH, INCHES

	2	2½	3	3½	4	4½	5	5½	6	6½	7	
40	16' 4"	14' 6"	13' 1"	11' 10"	10' 10"	10' 0"	9' 3"					
50	20' 6"	18' 2"	16' 4"	14' 10"	13' 7"	12' 7"	11' 8"	10' 10"	10' 2"	9' 7"		
60	24' 7"	21' 10"	19' 8"	17' 10"	16' 4"	15' 1"	14' 0"	13' 1"	12' 3"	11' 6"	10' 10"	10' 3"
70	28' 9"	25' 6"	23' 0"	20' 10"	19' 1"	17' 8"	16' 4"	15' 3"	14' 4"	13' 5"	12' 8"	12' 0"
80	32' 10"	29' 2"	26' 3"	23' 10"	21' 10"	20' 2"	18' 9"	17' 6"	16' 4"	15' 5"	14' 6"	13' 9"
90	37' 0"	32' 10"	29' 7"	26' 10"	24' 7"	22' 9"	21' 1"	19' 8"	18' 5"	17' 4"	16' 4"	15' 6"
100	41' 1"	36' 6"	32' 10"	29' 10"	27' 4"	25' 3"	23' 5"	21' 10"	20' 6"	19' 3"	18' 2"	17' 3"
110	45' 3"	40' 2"	36' 2"	32' 10"	30' 1"	27' 9"	25' 9"	24' 1"	22' 7"	21' 3"	20' 0"	18' 11"
120	49' 4"	43' 10"	39' 6"	35' 10"	32' 10"	30' 4"	28' 2"	26' 3"	24' 7"	23' 2"	21' 10"	20' 8"
130	53' 6"	47' 6"	42' 9"	38' 10"	35' 7"	32' 10"	30' 6"	28' 6"	26' 8"	25' 1"	23' 8"	22' 5"
140	57' 7"	51' 2"	46' 1"	41' 10"	38' 4"	35' 5"	32' 10"	30' 8"	28' 9"	27' 0"	25' 6"	24' 2"
150	61' 9"	54' 10"	49' 4"	44' 10"	41' 1"	37' 11"	35' 3"	32' 10"	30' 10"	29' 0"	27' 4"	25' 11"
160	65' 10"	58' 6"	52' 8"	47' 10"	43' 10"	40' 6"	37' 7"	35' 1"	32' 10"	30' 11"	29' 2"	27' 8"
170	70' 0"	62' 2"	56' 0"	50' 10"	46' 7"	43' 0"	39' 11"	37' 3"	34' 11"	32' 10"	31' 0"	29' 5"
180	74' 1"	65' 10"	59' 3"	53' 10"	49' 4"	45' 7"	42' 3"	39' 6"	37' 0"	34' 10"	32' 10"	31' 2"
190	78' 3"	69' 6"	62' 7"	56' 10"	52' 1"	48' 3"	44' 8"	41' 8"	39' 1"	36' 9"	34' 8"	32' 10"
200	82' 4"	73' 2"	65' 10"	59' 10"	54' 10"	50' 8"	47' 0"	43' 10"	41' 1"	38' 8"	36' 6"	34' 7"
220		80' 6"	72' 6"	65' 10"	60' 4"	55' 9"	51' 9"	48' 3"	45' 3"	42' 7"	40' 2"	38' 1"
240			79' 1"	71' 10"	65' 10"	60' 9"	56' 5"	52' 8"	49' 4"	46' 5"	43' 10"	41' 7"
260				85' 8"	77' 10"	71' 4"	65' 10"	61' 2"	57' 1"	53' 6"	50' 4"	47' 6"
280					83' 10"	76' 10"	70' 11"	65' 10"	61' 6"	57' 7"	54' 3"	51' 2"
300						82' 4"	76' 0"	70' 7"	65' 10"	61' 9"	58' 1"	54' 10"
320							81' 1"	75' 3"	70' 3"	65' 10"	62' 0"	58' 6"
340								80' 0"	74' 8"	70' 0"	65' 10"	62' 2"
360									79' 1"	74' 1"	69' 10"	65' 10"
380										83' 6"	78' 3"	73' 8"
400											82' 4"	77' 6"

MOST inclusive is this new lens chart produced by Kollmorgen Optical Corp., since it covers lens focal lengths ranging from 2 through 7 inches, projection distances from 40 to 400 feet (this latter size encompassing even the largest drive-in theatres), and picture widths from 9 to 85 feet. This chart, measuring only 3½ by 6½ inches for pocket convenience and varnished for durability, is available to all projectionists who apply to Kollmorgen at 2 Franklin Ave., Brooklyn 11, N. Y.

taken part in band competitions in both Canada and the U. S. He played clarinet in the 13th Royal Regiment, for nearly that long in the Hindoo Koosh Grotto band, and also with the Hamilton Symphony Orchestra. Music went by the board when Hugh started acquiring a flock of labor union jobs.

This fellow also studied oil painting, and while he won no international competitions, he didn't have to buy any pictures for his home when he was married in 1935. Around 1930 he endured the usual pains experienced by an amateur photographer, ranging from a Kodak through Graflex, Graphic, View Camera to a Leica, and finally settling for a pre-war Kodak with a coated f/4.5 lens. He helped organize and became secretary of the Hamilton Camera Club.

Manifold Labor, Civic Tasks

It would be futile to try to list this dynamo's labor union activities, so we'll have to settle for saying that, like Kilroy, he was there—and how. He has always been a serious student of labor relations, particularly in its legal aspects. This savvy won him a flock of labor tasks and a ton of work.

A delegate to the Hamilton Trade & Labor Council since 1920, Hugh Sedgwick surprised himself by being elected secretary of that body in 1935, the man who opposed him for office now being Canadian Minister of Labor. This set

Hugh up for many civic jobs, including the first chairman of the City Planning Board, vice-president of the Council for Adult Education and, lately, an organizer of the Hospital Associates.

He was elected secretary of the IA Eleventh District in 1946. He helped organize the Ontario Provincial Federation of the Trades & Labor Congress of Canada (similar to a state labor federation in the U. S.), being elected first a vice-president and subsequently secretary-treasurer. He is presently acting on a couple of conciliation boards for the Ontario Government. The list grows long but still falls far short of being inclusive of this Sedgwick fellow's labor activities.

Hugh's present hobbies are labor relations (a "hobby" he calls it) and book-collecting, and the Sedgwick library now contains a couple of thousand volumes ranging from technical subjects to illustrated limited editions picked up through the years. He is an associate member of the SMPE and a member of the Canadian Picture Pioneers. One can only wonder that Hughie's nine-year-old daughter recognizes her dad, since she must almost never see him.

When asked how he ever managed to indulge himself in even a bit of home life, Hugh explained "I have a very understanding wife who helps me in every possible way." Understanding? *Yea, verily.*

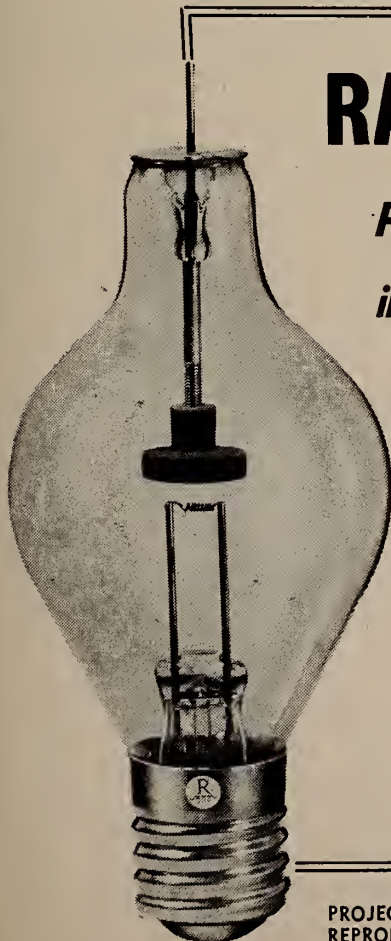
SMPE 64th Convention Set for Washington, D. C., Oct. 25-29

The 64th semi-annual convention of the Society of Motion Picture Engineers will be held at the Hotel Statler in Washington, D. C., Oct. 25-29 inclusive. A rich variety of technical papers for the nine scheduled technical sessions has been arranged, while the scheduling of dual or simultaneous sessions has been avoided, and one period—morning, afternoon or evening—has been left open each day.

Following the traditional get-together luncheon Monday noon will be a technical session devoted almost wholly to the dramatic achievements of the past year in television, with intermediate theatre systems (recording on film direct from the cathode tube) receiving major attention.

Two papers on the carbon arc for motion picture projection promise most interesting sessions—"Light and Optics in Motion Picture Projection," by E. R. Geib and C. G. Ollinger, and "Influence of Carbon Cooling on the High-Current Arc and Its Mechanism," by Wolfgang Finkelburg.

A tour of and a special technical papers session at the U. S. Naval Photographic



RADIANT Rectifier Bulbs

For dependable, noise-free D. C. power supply
in MOTION PICTURE ARC RECTIFIERS

These bulbs assure dependable, constant power supply. Precision-built of finest available materials for long life and efficient performance. Argon gas filled. Rugged construction. Guaranteed to give complete satisfaction in service for which it is designed.

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Manufacturers of lamps from 50 to 10,000 watts for

PROJECTION • SPOTLIGHT • FLOODLIGHT • MOTION PICTURE PRODUCTION • SOUND
REPRODUCTION • AERONAUTICAL • SPORTS LIGHTING • GENERAL SERVICE

Center at Anacostia, D. C., heretofore not permitted by reason of security considerations, will highlight Thursday's program, Oct. 28. Various aspects of special photographic processes, techniques and equipment will be discussed.

A resume of convention happenings together with abstracts of those papers of particular interest to projectionists will be published in the November issue of IP.

McColpin-Christie Rectifier Catalog

McColpin-Christie Corp. announces a new catalog describing and illustrating their complete line of light, medium and heavy duty metallic plate rectifiers. There are more than 60 standard models available in capacities from 150 watts to 14 kw output suitable for numerous industrial applications, including d-c carbon arcs.

Each model is a self-contained d-c power supply equipped with output control switch, suitable d-c terminals and output indicator. These units are compact, lightweight and can be furnished in portable or stationary types. The catalog, designated Bulletin I-48, is available from McColpin-Christie, Dept. A-6, Los Angeles 37, Calif.

Unique Time Chart for Suprex Trims

A unique chart which enables the ready calculation of running time for any film footage on either a 4- or 5-inch hub for all types

of Suprex-type carbon arc trims, calculated on the basis of 90 feet per minute, has been devised by Michael Smollin, projectionist of East Hampton, L. I., N. Y.

This copyrighted chart, priced at \$3 post-paid, while designed specifically for projectionist use, is regarded by Smollin as much an integral part of room equipment as any other unit and therefore a proper item for purchase by management. Several New York circuits have already adopted the Conversion Guide.

Amusement Taxes Continue Decline

July general tax admission receipts (June movie box-office receipts) totalled \$33 millions, about \$2 millions below same month in 1947. In five of the seven 1948 months collections have been below those of 1947, only March and June exceeding last year's take.

Paramount's Six Months Earnings

Paramount's earnings for the first six months of 1948, after all charges, is estimated at \$13,570,000, as compared with \$17,407,000 net for first half of 1947.

New Altec Chicago Headquarters

Headquarters of Altec Service Corp. for the mid-West area are now located in the Transportation Building, 608 So. Dearborn St., Chicago.



H. C. Arthur, Jr.

president,
Fanchon & Marco,
says:

"DO YOU WAIT UNTIL YOUR CAR BREAKS DOWN?"

"It does not make any difference whether you are running a motion picture theatre or you are taking care of your own automobile. There are two ways to do it. You can let your car run until it breaks down on some important trip causing extreme discomfort to your guests who are with you and causing extreme embarrassment to you or you can keep it serviced and save money in ultimate repairs and replacements as well as wear and tear on your nerves and on those of your guests.

"You can run your projection equipment on the same principle until it breaks down. Whether it is your car or your theatre equipment, when it does break down, you will wish you had had a regular efficient service that would have saved you all of the trouble and ultimately the greater expense.

"Altec's service is assurance against breakdown. It saves against a

larger expense in the long run for repairs and replacements and it saves your patrons annoyance and discomfort; both ultimately affect your P. & L. To maintain the goodwill of your patrons and their regular attendance at your theatre, don't let your equipment break down. That is my advice. Altec will help you follow it."

Altec Service, known for its service "over and above the contract" is a vital ingredient of your theatre's ability to meet successfully the competition of other forms of entertainment. An Altec Service contract is the soundest long term investment an exhibitor can make today.

ALTEC
SERVICE CORPORATION

161 Sixth Avenue
New York 13, N. Y.

THE SERVICE ORGANIZATION OF THE MOTION PICTURE INDUSTRY

GoldE 'Snap-It' Slide Binder

An entirely new idea in an aluminum 2 x 2 slide binder for slide projection is announced by GoldE Mfg. Co., Chicago, makers of light projection equipment and accessories. The new GoldE "Snap-It" binder makes it



Aptly-named new Snap-It slide binder by GoldE features round corners and an errorproof snap frame.

easier and faster than ever to mount 35-mm b-and-w or color film slides.

The film is placed between two pieces of glass in the binder which is snapped shut. The film stays put, is self-centering, is held flat, with no buckling and no cardboard to fray. "Snap-It" is the first aluminum binder with round corners, being shockproof and dustproof, and it protects the glass while preserving precious transparencies. It is readily re-usable, with an identification panel for projection guide.

This "Snap-It" binder comes complete with glass in a handy box of 20. Complete details from GoldE, 1222 W. Madison St., Chicago 7.

New Rectifier Bulb by Radiant

A new rectifier bulb which is absolutely ripple-free and which provides smooth, constant d-c power for motion picture rectifiers has been introduced by Radiant Lamp Corp., for many years an outstanding manufacturer of projection and exciter lamps, rectifier bulbs and associated equipment.

The new bulb, which is argon gas-filled, is rated at a maximum output of 15 amperes at 60 volts d-c. Extensive tests of this new bulb were conducted over a period of many months in various theatres, the results of which indicated excellent over-all operating characteristics.

A bulletin giving complete specifications of this new tube is available upon request from Radiant at 300 Jelliff Ave., Newark 8, N. J.

756 U. S. Drive-Ins; 86 Now Building

Drive-In theatres in the U. S. now total 756, with 13 closed and actual construction on another 86 now in progress, according to a producer's survey. Open throughout the year are 137 spots, while 606 open only seasonally. Total capacity of all situations is 313,378 cars.

Charlotte, N. C., area, with 107 drive-ins, leads, with Dallas ranking second with 79.

MAKING ENERGY TALK

(Continued from page 23)

voltage of the pulse for sample "a", lower still for "c".

Since the significance of the pulse lies in its voltage-amplitude, the receiver must act like a voltmeter, for it measures the voltage of each pulse as it comes in and plots the corresponding point on the pattern.

Talking in Time Samples Through Pulse-Length Modulation—II

In pulse-length modulation the transmitter sends out pulses of equal voltage and the length (duration) of the pulse is made to vary in proportion to the amplitude of the signal; for example, the pulse which goes out for sample "b" is shorter than that for "a", and shorter still for "c".

Since the measure of the signal is now pulse duration—a time interval—the receiver must act like a stopwatch. It measures the time interval from beginning to end of each pulse and plots these against time to reproduce the desired pattern.

Talking in Time Samples Through Pulse-Position Modulation—III

In pulse-position modulation there is no difference at all between pulses in either voltage or duration; instead they differ in the time at which they are sent and received. As with railroad trains, there is a prearranged normal time at which each pulse is scheduled to be dispatched. Then quite deliberately the pulse is dispatched off schedule, early or late, by an interval chosen to represent the sample.

Thus for sample "a" the transmitter sends forth a pulse not at the normal time but a little later; *how much* later is the measure of the sample. For sample "b" the pulse leaves exactly at normal time, and for "c" it leaves a significant time beforehand.

Here again the measure of the signal is a time-interval, and so the receiver again acts like a stopwatch. It times the interval between the actual time of each pulse and the corresponding normal

time. From the time intervals, it reconstructs the pattern.

Talking in Code Samples Through Pulse-Code Modulation—IV

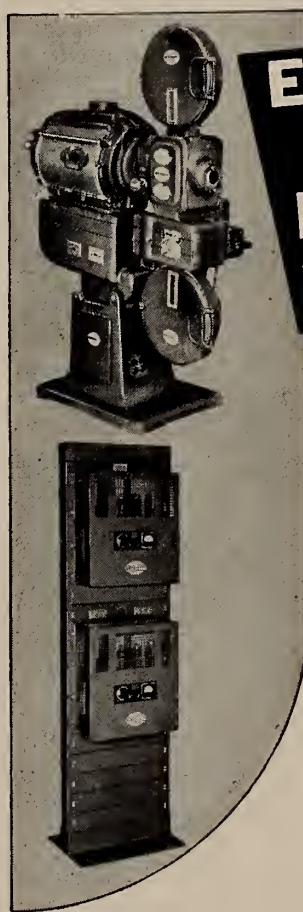
In pulse-code modulation, most recent contestant in the modulation art, the pulses are not only identical in voltage and duration, but are also fixed as to the times when they may occur. The pulses are transmitted in groups, one group to each sample, and a sample is represented by leaving out one or more pulses of the group according to a prearranged code.

Figure 6 shows the use of a four-pulse code; here sample "a" is signaled by

omitting the second pulse in the group. So the receiver's job is to note the presence or absence of pulses in the signal group and, with the aid of the code, interpret the meaning in terms of corresponding pattern-voltage.

This combination of pulse and code virtually disguises the voice pattern in transit so as to outwit that great enemy of communication—electrical disturbances which damage electrical patterns just as room noises garble a voice.

If, however, a speaker, instead of trying to talk through room noise, were to signal the pattern to us by means of prearranged sequences of on-or-off gong



**ESSENTIAL TO
GOOD
BOX OFFICE
FINEST PROJECTION
AND LIFELIKE SOUND**

They cost less over the years when you install



**PROJECTORS
AND
SOUND SYSTEMS**

Designed and built by specialists to assure long, trouble-free service.

The Completely New

MOTIOGRAPH PROJECTOR

Rock steady projection . . . clearest picture definition . . . smooth, cool operation. Easy accessibility of all units. Simplicity of design, precision engineered and skillfully constructed of finest materials.

TWO BASIC SOUND SYSTEMS

—one for theatres of 1,000 and another for theatres of 2,000 seats—the output of which may, by the addition of power amplifiers, be brought up to serve theatres up to 6,000 seats.

Your choice of any model Altec-Lansing "Voice of the Theatre" or Motiograph loudspeaker equipment.

DRIVE-IN THEATRE SOUND SYSTEMS

Central loudspeaker systems, with power output of 75 and 150 watts, and **COMPLETE IN-CAR SPEAKER EQUIPMENT**

In-car or post type speaker systems with power output of 150, 250 and 500 watts, the largest of which will serve more than 1800 cars, and has emergency provision permitting operation at 40, 250 or 500 watts.

The Motiograph sound reproducer is based on designs of Electrical Research Products Division of Western Electric Company.

**Literature and complete information
may be obtained from**

MOTIOGRAPH, INC.

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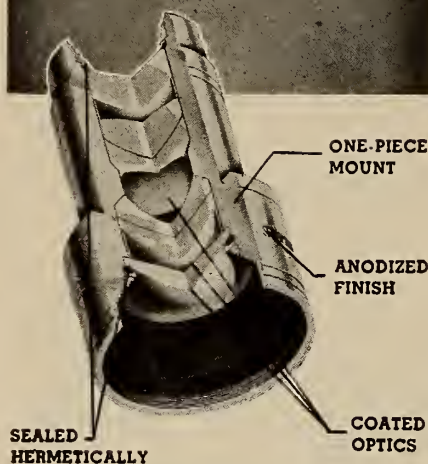
CHICAGO 24, ILL.

Jim Frank's New Photo Enterprise

James Frank, Jr., is the president of the newly-formed United Photo Supply Corp., 426 Luckie St., Atlanta, Ga., which will distribute brand-name photographic products to dealers through Southeastern U. S. Former New York branch manager for National Theatre Supply Co., Frank is the financial vice-president of the SMPE and was general chairman of the Theatre Engineering Conference held by the Society in New York in October, 1947.

Other motion picture activities of Jimmy Frank include a number of years with RCA Photophone and later as assistant sales manager of International Projector Corp.

HERE'S WHY THE SUPER-SNAPLITE IS UNEXCELLED



SIX ELEMENTS

A true Anastigmat for pictures wire-sharp to the very corners... in black-and-white or color!

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No dust or oil can enter the Super-Snaplite... it never needs to be taken apart for cleaning!

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This sturdy all-aluminum one-piece mounting can't loosen up or leak oil!

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The gleaming gold finish of the Super-Snaplite is an integral part of the aluminum... it can't chip or flake off!

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Durable anti-reflection coating on each glass-to-air optical surface nearly doubles the light transmission... gives brighter pictures, higher contrast!

SPEED OF 1/1.9

Exceptional speed for the utmost in screen brilliance without extra current consumption!

OTHER SNAPLITES

The 1/2.0 Snaplite Series II—hermetically sealed... critical definition... coated optics. For smaller theaters: the 1/2.3 Snaplite Series I—coated optics optional. For complete details on all Snaplite lenses, get Bulletin 204 from your local supply dealer.



KOLLMORGEN
2 Franklin Ave.
Brooklyn 11, N. Y.

tones, each short and sharp, our only problem would be in deciding whether or not the gong has sounded, something fairly easy to do. Pulse-code modulation does just that: instead of sending the delicate pattern at the mercy of the elements, it signals the information as pulse groups able to drive through interference.

At repeater points travel-worn signals being delivered of their messages are scrapped and the pattern is launched anew to span the next lap of its journey on a brand new set of pulses. Thus, clarity of transmission can be maintained through many repeaters over very great distances.

How often must a wave be sampled to secure faithful reproduction through pulse-transmission? As few as 8,000 samplings per second are sufficient to secure near-perfect reproduction of telephonic speech, but high-quality music with its more complicated pattern of more and steeper hills and valleys requires many more. Since the duration of each pulse is very brief, about one-millionth second, there is a long waiting interval between pulses. During this interval the pulses of many other conversations may be sent over the system.

Pulse-modulated signals cannot be transmitted efficiently over ordinary telephone circuits, since they entail high frequencies which make broad frequency-band transmission and other refinements essential. At present, pulse modulation is being used in microwave radio where the needed frequency space is more abundant.

In transmission by radio, the pulse-pattern may be imprinted on radio waves and transmitted through either amplitude-modulation, Fig. 7, or frequency-modulation, Fig. 8.

Radar a Dual-Transmission Example

Radar is another example both of pulse modulation and of building patterns from samples. The pulses of radio waves which a radar sends forth are similar in all respects and so do not, in themselves, convey any more information than would a buzzer sound repeated at regular intervals.

Radar pulses in transit would appear

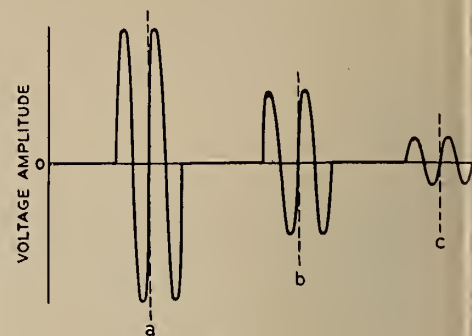


FIGURE 7

Amplitude-modulated waves carrying pulses.

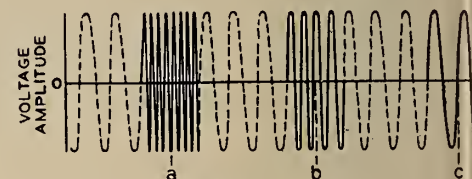


FIGURE 8

Frequency-modulated waves carrying pulses.

as in Fig. 7, except that all would be of equal height. Their purpose is to probe and sample the surrounding terrain for unseen objects. When a pulse strikes a target, that target replies with an echo. From echoes, the radar builds a picture of the target as to range, direction, and shape.

To summarize, we see that electrical energy is modulated to carry the imprint of a signal, through the manipulation of three and only three of its basic properties, amplitude, time and frequency. Each, like a special language, provides a distinctive way of making electrical energy talk.

SMOLLIN'S CONVERSION GUIDE

Accurate • Fast • Simple

Cuts carbon waste to absolute minimum. Calculates running time and footage of any reel. Theatre managers have purchased hundreds of these charts for their projection rooms.

Only \$3, postpaid.

M. SMOLLIN East Hampton, N. Y.

CLAYTON BALL-BEARING EVEN TENSION TAKE-UPS

For all projectors and sound equipments

All take-ups wind film on 2, 4 and 5 inch hub reels.

Silent Chain Drives

THE CLAYTON REWINDER

For perfect rewinding on 2000-foot reels.

CLAYTON PRODUCTS CO.
31-45 Tibbett Avenue New York 63, N. Y.

IN THE SPOTLIGHT

(Continued from page 21)

Films, informed us that after interviewing more than 300 exhibitors, who showed him their books, box-office returns were equal to and in many instances higher than they were during the pre-war years.

These items do not jibe with the wails of exhibitors who have been making headlines in the trade press complaining about the drop in box-office receipts. They hold up as a yardstick the receipts of the lush boom period (for them) of several years ago, overlooking the fact that those were not normal times. In a discussion with the president of a large theatre circuit, he admitted to us that his theatres were all showing very handsome profits but were not quite up to the receipts of several years ago, thus he felt that the profits were "below par." Of course, when pinned down to basic facts, he acknowledged the fallacy of such reasoning.

• *Highlights from Local 380, Oklahoma City, Okla.:* Frank T. Holick and J. T. Peyton represented the Local at the Oklahoma State Federation of Labor Convention held last month in Muskogee, Okla. . . . Howard Wortham, charter

member of the Local and former salesman for National Theatre Supply Co. in this district, is now chief projectionist at the new Sooner Theatre. . . . The Local threw a shindig at the Variety Club rooms in honor of its members who served in World War II. Bob Croasdale, projectionist at the Warner Theatre and one of the vets at the party, is now vacationing in Los Angeles. . . . Business agent Hi Berling planed home from the Cleveland convention after his car was wrecked about 100 miles south of that city. Hi suffered three broken ribs and bruised knees, and his car, a 1947 Pontiac, landed in the junk pile.

• Wm. H. (Dick) Miller, member of Stagehands Local 112, Oklahoma City, Okla., for over 30 years and stage carpenter at the Oklahoma State Fair, died recently while on the job. Miller enjoyed the friendship of many figures prominent in the public eye, and was a close friend of Oklahoma's ex-governor Jack Walton.

• Los Angeles Local 150 scored a smashing victory over the Board of Building and Safety in its fight to have three of its members reinstated as examiners for the city of Los Angeles. Several months ago, for no apparent reason, George Schaffer, business agent, Fred Borch and Arthur Schroeder were removed from their posts as examiners of motion picture projectionists. The matter was taken to court, and Judge Clarence Hanson, of the Superior Court of Los Angeles, who heard the case, directed that the examiners be reinstated in their positions without delay. The Local was represented by Burton Fitts, former district attorney for L. A., who was ably assisted by A. Moresby White.

Home Movie Boom Alarms Exhibs

Typical of the development which is causing concern among movie theatre owners is the situation in Minneapolis where some 20 home movie rental firms have reported a 100% increase in sales volume for the first half of 1948. Influx of lightweight, relatively inexpensive home projectors, plus terrific promotion splurge by retailers, gets major credit for the splurge.

Hundreds of families now do their weekend movie shopping, not at the box-office, but at their film library or camera shop. Rentals range from \$3 to \$15 for a complete film program. Some film stores are considering two-hour "packaged programs" plus projector for flat rental, somewhat less than the sales for individual units.

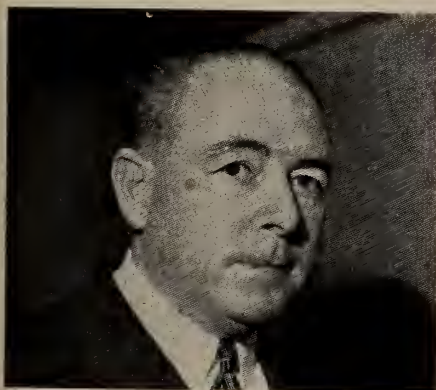
Projection Equipment in Sweden

All 2462 film theatres in Sweden are wired for sound. German and Swedish equipments are preferred to U. S. units because they are much less expensive. Equipment is in good

condition, with sufficient spares on hand to ensure operation for five years, or until German and other equipments are again available. Units in large theatres are from 5 to 7 years old, that in smaller houses 7 to 10 years.

Arc lamps in the 40-80-amps range number 1700; while there are 2000 low-intensity equipments. Most rectifiers are of the dry-disc type, with 90% of the available power

NEW FILM CEMENT ALL
for Splicing
Acetate and Nitrate Film
(Safety) Colored and Black and White
ROSCO LABORATORIES
367 Hudson Ave., Brooklyn 1, N. Y.



GROVER L. SMITH—Owner, Grover L. Smith Family Theatres, Glendale, Calif.—says:

"I have always used RCA Service. It's prompt, efficient and keeps my theatres operating at maximum efficiency."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, New Jersey.

SUPER
La Vezzi
SERVICE

PRECISION MADE

PROJECTOR PARTS

Completely Interchangeable

EXACT DUPLICATES ALL WAYS!

Controlled precision manufacture by skilled operators using newest, most modern equipment makes certain that each La Vezzi part is identical not only in looks but also in fit and performance. Maximum life is assured by making from finest materials. In gears, highest grade gear bronze—molded and laminated Phenolic for quiet and strength combined—high strength semi-steel castings and high tensile steel. Surfaces are hardened and ground for longer wear. Specify La Vezzi SUPER-SERVICE parts for all your replacements—they are your best buy. At Theatre Supply Dealers everywhere.

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4635 WEST LAKE STREET
CHICAGO 44, ILLINOIS

40 Years
1908 1948
of service



PROJECTIONISTS' SERVICE MANUAL
\$3.00

being 200 volts, 50 cycles a-c. The market for U. S. equipment is definitely not good; likewise for imports from any other hard-currency area.

Giant Telephoto Lens for USAF

An aerial telephoto lens nearly four feet long and 150 pounds in weight has been built by Kodak for the U. S. Air Force. Largest ever produced at the Hawk-Eye Works, the lens, 15 inches in diameter, is designed especially for high-altitude color pictures.

The lens has a 60-inch focal length and

an F:6.0 aperture. Biggest previous lens made at Hawk-Eye was a 48-inch, F:6.3 telephoto, also delivered to the USAF. Composed of five glass elements, the lens has a built-in thermostatically-controlled electric heating device. The heating coils serve to keep the lens and its mount at a constant temperature. This aids in keeping the lens in proper focus at all times.

Dimmer Controls in Projection Rooms

More than 75% of dimmer controls installed in motion picture theatres are located in the projection room, with the balance

being spotted backstage, reports D. M. Rollins, engineer for Ward Leonard Electric Co., Mt. Vernon, N. Y., specialists in such control units. When considering all types of installations, however—professional theatres, University, high school and experimental theatres, municipal auditoriums, etc.—40% of the total have controls in the projection room, 55% on the stage, and the balance in the auditorium.

Technical Literature For Sale

L. P. Work, occasional contributor to IP, will sell the following:

102 issues of SMPE *Journal* from May 1937 through December 1946, in excellent condition (\$25). Books: Principles of Radio Communication, 3rd ed. (Morecroft); Elements of Acoustical Engineering (Olson); Applied Acoustics, 2nd ed. (Olson & Massa); Radio at UHF's (RCA Tech. Press); A-C Bridge Methods (Hague); Frequency Modulation (Hund); Transmission Circuits for Telephonic Communication (Johnson); Theory of Vibrating Systems & Sound (Crandall); Communication Circuits (Ware-Reed); UHF Techniques (Brainerd, Koehler, Reich & Woodruff); A-C Current Rectification (Jolley); Handbook of Chemistry & Physics, 28th ed., 2500 pages. Entire lot in perfect condition (\$10).

Complete issues of *Electronics* for 1947 (\$3). All the foregoing is offered for \$35, or individually as quoted, f.o.b. Dearborn. Address L. P. Work, 10441 Tireman, Dearborn, Mich.

Technicolor 6-Month Net Rises

Net profit after taxes of Technicolor, Inc., for the six months ended June 30 is estimated to be \$880,800, equivalent to 96c a share, as compared to \$734,200, equivalent to 80c a share, for the corresponding six months of 1947.

SWITCHES IN PROJECTION

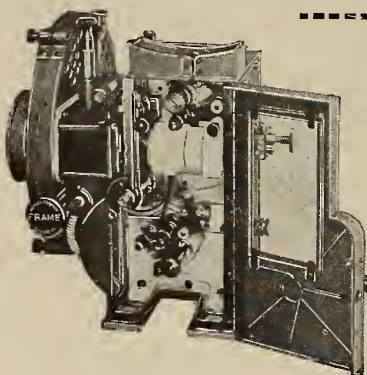
(Continued from page 16)

he dismantled the double-pole toggle switch, but a glance revealed that it was past hope of repairing. There was an old switch in the spare parts cabinet, so the projectionist postponed the purchase of a new switch.

The spare switch was installed without delay, and the projector began running the moment the fuse was replaced in the motor circuit. Curiously, a flip of the switch did not stop the projector, but only caused it to slow down for an instant, and then speed up again. Another flip produced the same result, a temporary slowing followed by sudden resumption of full speed.

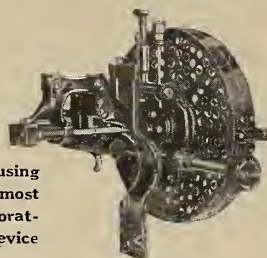
Perplexed by the fact that both positions of the switch were "on," the projectionist summoned an electrician, who at once perceived that the switch was not a double-pole switch, as supposed, but was a 4-way switch, commonly used in conjunction with 2-way (3-way) switches for controlling lights or other appliances from several points in a building. A 4-way switch has the external appear-

YOUR ASSURANCE OF THE BEST!



WENZEL Rear Shutter Bracket

A one-piece design using one less gear than most rear shutters, incorporating a new framing device brake.



Write for our NEW complete catalog WC25. We will sell only through independent Theatre Equipment Dealers. Mention the dealer serving you.

WENZEL

"Smooth-Running" PROJECTOR

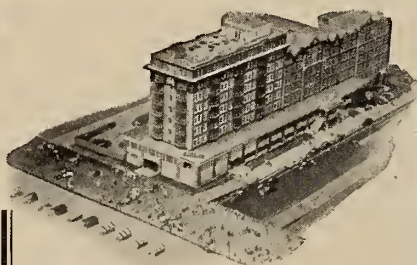
You are assured of "Smooth-Running" performance with the Wenzel time-proven projector. Use Wenzel's precision replacement parts . . . and your present equipment will do a smoother-running job.



LLOYD H. BRIDGHAM—Owner, Uptown Theatre, Dover, N. H. . . . State Theatre, Presque Isle, Maine . . . Harbor Theatre, York Harbor, Maine—says:

"Fifteen years of RCA Service in my theatres has proved to be one of my best investments."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, N. J.



HOTEL STRAND ATLANTIC CITY'S HOTEL of DISTINCTION

Devoted to the wishes of a discriminating clientele and catering to their every want and embracing all the advantages of a delightful boardwalk hotel.

Spacious Colorful Lounges—Sun Tan Decks atop—Open and inclosed Solaria—Salt Water Baths in rooms—Garage on premises. Courteous atmosphere throughout.

When in Atlantic City visit the
FAMOUS FIESTA LOUNGE
RENOWNED FOR FINE FOOD

OPEN ALL YEAR
Under Ownership Management
Exclusive Penno. Ave. and Boardwalk

ance of a double-pole toggle switch and, like the latter, it has four terminal screws.

Knowing beforehand what was required, the electrician had brought a double-pole toggle switch with him, and he installed it. Although the new switch worked perfectly, the projectionist had a vague feeling that the machine did not run with its usual quiet smoothness. Disconcerting suspicions were laid aside, however, and the projectors were threaded up with the first two reels of the evening show.

Stripped Gears, the Result

Projection of the first reel was perfect, but when the changeover was made to the projector having a new switch, the screen flickered briefly and went dark. There was a grinding of gears and the motor stalled. Examination of the head revealed a stripped spiral shutter gear. Needless to say, the remainder of the show was run on one machine.

The damage had been caused by the 4-way switch, the "spare" that the projectionist had unthinkingly installed after the matinee. It had permitted the powerful starting torque of the motor to be added to the momentum of the already revolving gears, and this several times repeated. The violent "yanking" proved too great a strain for the spiral shutter gear.

Projector motor switches are very often worn out prematurely by the bad practice of switching the motor on and off in rapid succession to check threading. Threading should always be checked by turning the machine by hand. The amount of current that a motor switch is called upon to interrupt when a motor is shut off before attaining full speed is many times the current which flows during normal running. When a switch is overworked in this way, the contacts "burn." Badly burned contacts fail to establish a good electrical contact, and the heat generated by the passage of current hastens the process of deterioration.

A certain amount of arcing at switch contacts is unavoidable. A spark is ordinarily produced only when a switch is opened, not when it is closed, because the "time constant" of the circuit makes it impossible to start or stop the flow of current instantaneously, and also because the current continues to flow all the time the contacts are being separated, sufficient heat being generated when the contact area becomes very small to vaporize a portion of the copper and produce an arc which maintains itself for an instant after the contacts have actually separated. Copper vaporizes at 4190° F, so some portions of the spark must be at least as hot as this, and probably hotter.

When a circuit is "inductive"—that is,

when it contains motors or electromagnets—additional punishment is inflicted on the switch. Any attempt to break such a circuit results in a "kick" of induced current—in some cases rapid oscillations of rather high voltage—which increases the intensity of the spark and shortens the life of the switch. The National Board of Fire Underwriters takes this fact into account by specifying that switches in motor circuits have ampere ratings at least *twice* the full-load current ratings of the motors they are to control.

Sparking may be minimized by throwing a condenser across the contact points of a switch to absorb the arcing current. But we must not connect condensers across switches in a-c circuits, for condensers pass a-c, the amount depending on the intensity and frequency of the current and the size of the condenser. D-c circuits are another matter, for d-c cannot pass through a condenser as long as its intensity remains constant.

Many of the old-style arc feed controls used to have condensers connected across the relay points to prevent the sound



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system from picking up spark "clicks" from that source.

The maintenance of switches is a small matter—periodic inspection is the important thing. Small defects are easily corrected. Knife switches may require



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cleaning and tightening of the contact jaws. Burned contacts should be smoothed with a magneto file and then furnished to a bright polish with crocus cloth. The contacts of most toggle switches are not accessible for proper cleaning, hence the installation of a new switch is the logical remedy. A drop of oil applied to each pivot of a toggle switch with a toothpick will greatly prolong the mechanical life of the switch.

20 YEARS OF SERVICING

(Continued from page 15)

tions of the new and established installations, perfected adjustments, reoriented horns, eliminated hums, made acoustic surveys and performed other valuable service functions.

The technical inspection group continued in action until about 1930, by which time the field personnel, now mostly service engineers, had been raised to the level of ability of the TI. The training of the service inspector, however, has never abated. Special schools, new test methods, improved instrumentation and technical bulletins have been the means of maintaining steady growth in competence.

It was, of course, perfectly obvious that the success of the sound show was and

will always be in the hands of the projectionist. But he had much to learn during the time that the installation was being made and the one- or two-week instruction period that followed installation.

Projectionists wanted to learn more about the fundamentals of sound recording and reproduction. To meet this demand in 1930-31 one man uniquely qualified was assigned to the full-time job of conducting classes for projectionists. These classes were held twice a day every day for about a month in space provided by the union locals in a considerable number of the larger cities. The genuine desire of projectionists to master sound projection was attested by the consistently good attendance at these classes.

Transmission Test Formulated

It was inevitable that the inspectors scattered throughout the country tended more and more to become individuals. Several hundred pairs of ears did not interpret sound quality in the same manner. The TI group was an equalizing influence to some extent, but with the termination of that organization the need was felt acutely for means of ensuring that each equipment was maintained to the same standard. The solution was the calibrated multi-frequency test film and the transmission test.

For several years technical inspectors and a few service inspectors had been using copies of a test film known as XX22. Readings were taken from this film, curves plotted, heads were scratched, but the inevitable question—"So what?"—remained unanswered. Means of interpreting the readings and standards of performance were required.

Even at this early day a considerable variety of systems was encountered. But most of them were made up from a much smaller variety of components. The method was therefore adopted of determining standards of performance or "normals," as they are called, for the various amplifiers, optical systems, etc., and thus equipping the inspector to determine the over-all or total normal for any particular system from such component normals.

Calibrated Test Films

Thus was born the well-known Transmission Test. By this powerful tool an inspector could determine whether any sound system was performing in a normal manner. The test at once proved so effective in revealing substandard performance and leading to correction of long-standing troubles that it became clear that it must be placed in the hands of all inspectors.

Suitable compact meters were developed. The provision of calibrated multi-frequency test films still presented a major problem. Repeated efforts failed

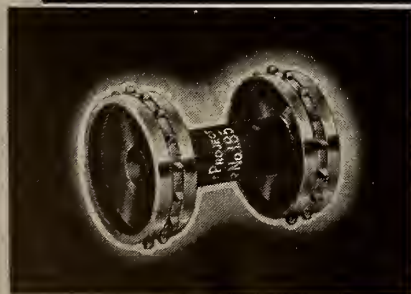
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to produce uniformly satisfactory prints from a negative—satisfactory, that is for testing purposes. The recording experts suggested the “toe recording” method which obviates the printing process entirely, every foot of test film being recorded directly in the recording machine.

R. O. Strock, then of Eastern Service Studios, worked out the practical details of large-scale production of test films by this process, and the result was an expensive but high-quality product that fully met our requirements. Through succeeding years, Mr. Strock recorded over a million feet of test film for us.

Each of the test films had to be individually calibrated against standards originally provided by Bell Labs. Later, our own method of calibration known as the “inverse-speed” method was developed, and this still is our standard means of calibration.

With complete test equipment in the hands of all inspectors, the transmission test became a standard part of sound service. Somewhat enlarged, this test today includes measurements of frequency response, system gain, amplifier gain, required net gain for full house operation, system overload point, amplifier impedance, speaker impedance, and system noise. Limits of departure from normal for most of these tests are provided for most equipment.

At regular intervals, each inspector applies all of these tests to each system serviced. His detailed report is studied by his supervisor to ensure that irregularities of importance are corrected. By this means, all theatres which receive this kind of service are assured that the correct standard of performance is maintained.

Historically, the introduction of the Transmission Test on a universal basis eliminated much of the individualism in service and provided organization-wide standard performance.

‘Noiseless’ Recording Bows—1931

The problems faced by the producing organizations with the advent of sound and how the methods of production were revolutionized to solve them is an intriguing story that cannot be told here. Suffice it to say, however, that these problems were presently solved. Attention was then directed to means of improving the quality of recording.

One defect of early film recording was the high level of noise present on the sound track. This film noise was not objectionable during loud passages, but during low-level intervals it was all too evident. It was found that darkening the track during the low-level sections greatly reduced background noise without interfering with the recording itself.

This technique, still called “noise reduction,” gave us what was termed “noiseless recording”. The name was

perhaps not an overstatement for 1930 to 1931, but recording engineers have striven valiantly for 17 years to produce true noiseless recording. However, the improvement was dramatic.

Reduction of recorded noise, however, revealed the many noises produced by the reproducing system which for the most part were not objectionable with the earlier recording. The first picture produced with noise reduction, “The Right to Love,” was widely publicized as having noiseless recording. The tremendous job fell upon the service forces to quiet reproducing systems during the first run period of this picture so that the publicized marvels might be brought to the ears of the theatre patrons.

Late in 1930 a “flying squadron” was formed from men brought in from all over the country and given a thorough training in a quickly improvised technique of making systems quiet—eliminating clicks, microphonics, hisses, hums, etc. These men then scattered over the land and applied these new techniques. The expenditure for the training and the intensive field campaign was close to \$100,000.

Some of the stunts devised under pressure bordered on the fanciful, including hanging lead weights on vacuum tubes to reduce microphonics; but they served their immediate purpose and the improve-

ment in recording was well received. Soundly engineered improvements, such as low microphonic tubes, soon appeared and the systems were left with the improvements in permanent and substantial form.

[To be Continued]



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PREVENTING FILM DAMAGE

(Continued from page 10)

be kept clean. Care should be taken to see that they revolve freely, as a sticking roller can cause bad emulsion scratches, especially if it is worn, thus permitting the center of the roller to come in direct contact with the face of the film. This is especially true of the upper magazine rollers around which dirt and small pieces of film very often accumulate.

ADJUSTMENT OF FILM TRAP DOOR—On older models of one make of projector the film trap door is designed so that it can be removed easily by merely lifting it from its holder. In replacing this film trap door, care should be taken to see that it is seated properly; if this is not done, the intermittent sprocket may be ruined, the shaft bent, and the film running through the projector at the time ruined. On the newer models this difficulty has been eliminated by locking the trap door into position on two studs.

STRIPPERS ON UPPER AND LOWER SPROCKETS—On some projectors so-called strippers or stripping plates are provided to prevent the film from winding around or "following" the sprockets as well as to remove any accumulation of dirt that may tend to form at either side of the sprocket teeth. In resetting these strippers after the replacement of sprockets, extreme care must be taken to see that they do not come in contact with the teeth, as this may cause burring or even more serious tooth damage and result in abnormal film wear.

UNNECESSARY OILING—Flooding the

mechanism with oil is unnecessary and causes oil to get on the film so that a mottled appearance results on the screen. Oil also causes an accumulation of dirt on the film and makes good, clear projection impossible. Oily film is difficult to wind evenly, and when a single wrap protrudes from the roll, the edge is easily broken.

Oil in the intermittent casing must be kept at the proper level. Other parts should be oiled as recommended by the manufacturer.

STICKING—In case unlubricated or insufficiently lubricated film is started on a projector, sticking in the gate or trap will be indicated by an unmistakable clatter. Prompt action may be required to save the print. Apply a small amount of oil to the thumb and forefinger of each hand and hold against the film in the perforation area up near the guide rollers for a few seconds at a time. Although this is rather awkward to do on some projectors, frequent applications of oil will prevent damage to the film. It is understood that this procedure should be followed only in an emergency.

[NOTE: Most of the foregoing information is fundamental and applies to nearly all types of projection equipment. However, unusual situations not covered by the foregoing may arise, and Eastman Kodak Co. should appreciate having them called to its attention, through IP.—Ed.]

General Aniline Doubles Profit

Net profit of General Aniline & Film Corp. (ANSCO) for the first six months of 1948 were \$3,651,000, compared with \$1,677,000 for the same period of 1947. Net

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Of INTERNATIONAL PROJECTIONIST, published monthly at New York, N. Y., for October 1, 1948.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared R. A. Entracht, who, having been duly sworn according to law, deposes and says that she is the Business Manager of INTERNATIONAL PROJECTIONIST and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation, etc.) of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, International Projectionist Pub. Co., Inc., 19 West 44 Street, New York 18, N. Y.

Editor, Henry B. Sellwood, 19 West 44 Street, New York 18, N. Y.

Managing Editor, None.

Business Manager, R. A. Entracht, 19 West 44 Street, New York 18, N. Y.

2. That the owner is:
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3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bonafide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

R. A. Entracht, Business Manager

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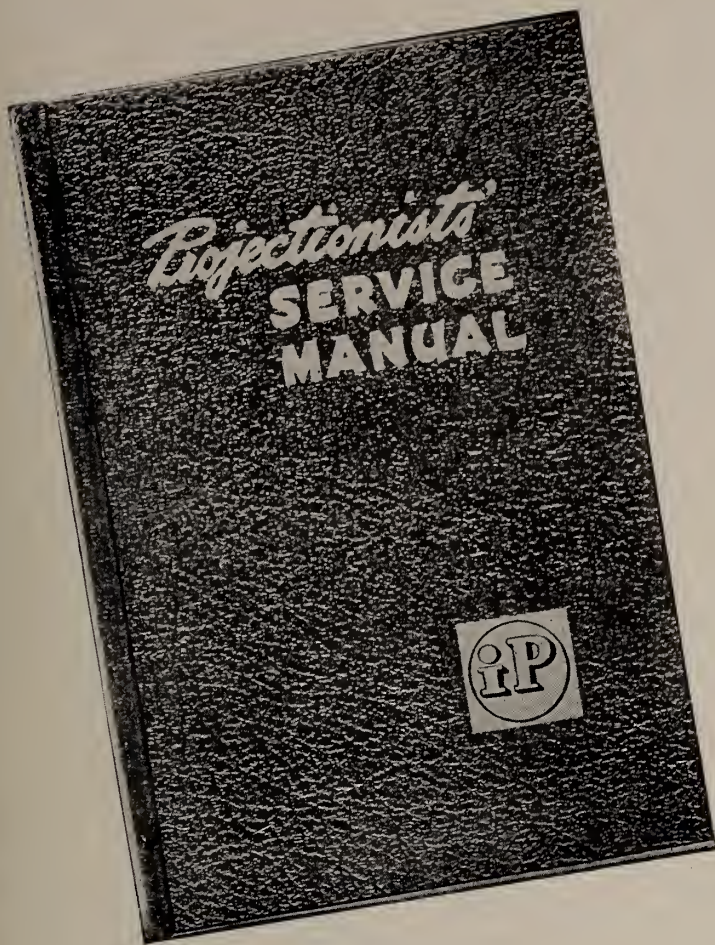
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HENRY B. SELLWOOD, *Editor*

Volume 23

NOVEMBER 1948

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MONTHLY CHAT

EVERY single thought and effort comes to fruition in the projection room. No flight of imagination, no exercise of scientific knowledge nor the degree of skill with which it is applied compares with the miracle that is wrought every hour of the day in thousands of projection rooms where the sum total of effort by a giant industry is brought to fruition. This modern miracle is accomplished by means of a narrow ribbon of motion picture film within which is imprisoned the cumulative contributions of many minds and many hands. Yet, this length of film, while the dominant factor, is in truth subordinate to other factors the utilization of which give it life and meaning. Not the least important of these factors is the degree of craftsmanship exercised by the projectionist.

This being so, and it is so, those projectionists who unthinkingly sound off in terms of last-ditch opposition to the introduction of some new element or technique are not only futilely opposing the inevitable but are doing a great disservice to the craft at large.

A case in point is the new acetate film which, like it or not, will soon be used on a large scale for theatre release prints. Now, this film base will either do the job well or it will be a flop, which decision will be rendered on the basis of *performance* in the field. If the prints do the job well—and it seems certain that they will—projectionists will be confronted with a fact that no amount of vocal outpouring will alter.

IP has frequently stressed the hazards incident to the use of nitrate film and it fought the good fight for adequate safeguards for both projectionists and the theatre-going public wherever this film was used. But it never confused the issue of safety with craftsmanship, and it is the latter that any projectionist worthy of the name has to offer whatever elements enter into the process.

Somebody cynically inquired the other day, "What's the matter with you fellows; do you want to go on living with trouble just to complicate matters?" The answer then and now is an emphatic "No." We fellows are not firemen, nor plumbers, nor carpenters nor anything but members of a craft which for the past fifty years has delivered in terms of performance the type of work which has earned the title of "craftsman."

And so we shall continue to merit this title no matter what the character be of either material or technique required to do the job.

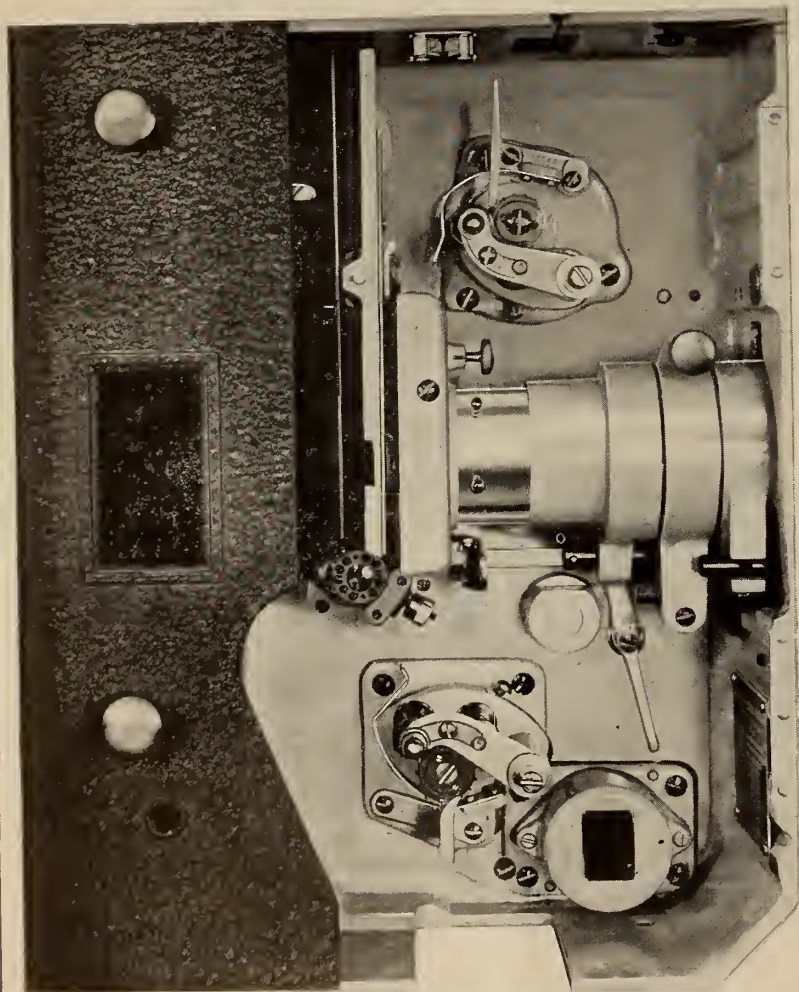
No single element in the projection process—even though it be the film itself—is more important than the projectionist himself, as has been amply demonstrated down through the years. Craftsmanship—in this case another name for showmanship—is what we're selling, always have and always will.

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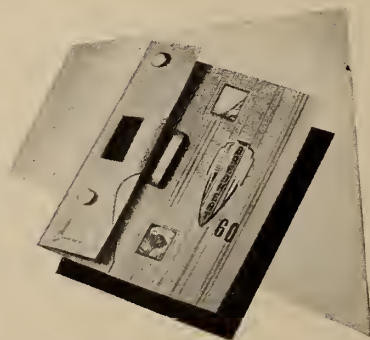
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Sound System Components

By ROBERT A. MITCHELL

I. Testing Amplifier Parts

THE purpose of any sound amplifier is to convert the very feeble fluctuating voltages developed by a photoelectric cell or other source of "sound current" to currents of sufficient power to drive the loudspeakers. An amplifier performs this function by acting as a valve in which strong direct (non-varying) currents are *modulated* by the alternations of the weak input current.

If *distortion* is to be avoided, the variations of the output current must correspond very closely to those of the input. Modern designing practice seeks to reduce distortion in the output current to 5% or lower.

Although the principles of sound amplification are easy to understand, no mere glance at the interior of an amplifier will reveal the manner in which the various amplifier parts are interrelated. The wiring appears to be a jumble, and no matter how well-versed we may be in the basic theory involved, we shall find it necessary to spend many minutes tracing out the circuits with the aid of a wiring diagram if we are to determine the place and purpose of each piece of apparatus.

Few Parts in Amplifiers

It will be noticed at once that the different wires have insulation of different colors, a feature that assists greatly in distinguishing the various circuits. Further help lies in the fact that these colors are indicated on the manufacturer's diagrams.

An amplifier, like an atom, is "mostly empty space." Imagine an amplifier to be completely taken apart and that all the wiring is placed in one pile, while all other electrical parts are placed in another pile. It will be found that all the wires and all the electrical components of a modern theatre amplifier, with the possible exception of the largest power transformers and stack rectifier units, may be easily stuffed into one's coat pockets! Those who have stripped down old radio sets in order to acquire a stock of resistors, condensers, *etc.*, will not be surprised by the small number of parts in a sound amplifier.

If we examine closely the pile of electrical parts we shall find transformers, iron-cored chokes, at least one rheostat or potentiometer, one or more large power-pack filter condensers, and, among other things, sockets for the tubes, a few switches, and a handful of tiny resistors and condensers.

Of course, amplifiers are never stripped down completely for repairs, not even for the most "surgical" of servicing operations, but anyone who has access to an unwanted radio set (which is nothing but a small amplifier connected to a wave-detecting circuit) may enjoy a good half-hour of harmless dissecting. The mere destruction of radio sets will not, however, teach us very much about the principles of sound amplification.

A good way to begin a study of amplifiers is to select a few resistors,

capacitors, *etc.*, from a collection of parts and learn how they are rated and how their electrical condition may be tested. This information will prove especially valuable to projectionists who wish to know whether the spare amplifier parts they may have are fit for emergency service. A later, more exhaustive study of the functioning of these parts in the amplifier will then be an easy step.

Types of Resistors

Resistors are very simple pieces of electrical apparatus, but they are tremendously important. A complete theatre amplifier contains from 20 to 50 resistors, so we shall have no difficulty ferretting one from almost any collection of discarded sound-system parts. The smallest resistors may be less than an inch long and not even as thick as a lead pencil! Larger ones are fair-sized coils of resistance wire.

Resistors constructed so that the resistance may be varied by moving a slider or turning a knob are called *rheostats*. The contact arm, or wiper, of an ordinary rheostat may be moved to any point along the length of the resistance coil or carbonized strip. A rheostat which is tapped at both ends of its resistance coil is called a *potentiometer*.

A careful examination of nearly any *fixed* resistor will reveal an imprint or other indication of its resistance rating in *ohms* or *megohms*. An ohm is a specified amount of resistance to the flow of electric current, and is frequently represented on amplifier wiring diagrams by a capital omega, Ω . A megohm equals

one million ohms and is sometimes represented by a small omega, ω .

If the rating does not appear on the resistor as a number followed by "OHM" or "MEG," we shall probably find spots and bands of colored paint. According to the RMA (Radio Manufacturers' Association) color code, the value of a resistor in ohms is given by three dots or bands of color. Here is how the code is used.

The RMA Color Code

The first color represents the first figure of the resistance rating, the second color the second figure. The third color represents the *number of zeros* following the first two figures. But how are the first, second, and third colors distinguished?

In one type of resistor the first color is the color of the *body* of the resistor, the second color is that of the *tip*, and the third color is a *dot* placed near the middle of the resistor. The order may well be memorized: body, tip, and dot.

In another type of color-coded resistor the colors are in the form of *bands*, the first band being the one nearest the end. A fourth band is sometimes added after the other three. This band indicates the degree of accuracy of the resistance rating as given by the first three bands and is usually gold or silver (but sometimes brown, red, orange, or yellow).

Table A shows the complete RMA color code. By using this chart you can quickly "read" the rating in ohms of any color-coded resistor.

The current-carrying capacity of resistors, given in *watts*, is a thing apart from the resistance value in ohms. If the current-carrying capacity of a resistor be exceeded, overheating of the unit will result.

The smaller resistors are molded from a mixture of powdered carbon and clay: the greater the proportion of clay, the higher the resistance. Like projector carbons, they may become cracked or broken. Excessively high temperatures ruin them by melting the solder which secures the lead wires to the carbon. Among the injuries which commonly befall wire-wound resistors are cracked porcelain coil supports, short circuits, and broken or severely oxidized resistance wire.

Testing Resistors

It is usually a simple matter to test a resistor. If the resistance value is very low, a battery of two or more dry cells and a d-c voltmeter may be connected in series with the resistor to be checked. However, most of the resistors used in amplifiers have resistances of many thousands, even millions, of ohms and accordingly will not pass sufficient cur-

rent from dry cells to register on the voltmeter.

It is always possible to use high-voltage currents and earphones, but the procedure is rather clumsy. There is a better "kink" that may be used by projectionists who have "non-syncs" with phonograph pickups of the crystal type. Here it is:

Disconnect the "hot" lead (red wire) which connects the crystal pickup to the amplifier input. Insert the resistor into the circuit (in series with the pickup), turn on the amplifier and play a record. If the resistor be a good one, music will come from the speakers but with more or less reduction of volume (because the action of a resistor is to reduce voltage). The volume reduction will not be great unless the resistance is higher than 500,000 ohms. No sound indicates that the resistor is "open."

Do not be surprised if the non-sync sounds better, even if fainter, with a 500,000-ohm resistor in the circuit. An increase of "load resistance" has the property of improving the low-frequency response of crystal-type pickups.¹

These simple tests do not measure the precise degree of resistance but serve only to indicate whether or not a resistor is "shorted" or open. Accurate checks of resistance ratings require the use of a Wheatstone bridge.

Wide Variety of Capacitors

Capacitors, or condensers, appear in a wide variety of sizes and shapes. A theatre amplifier contains a large number of them—almost as many as it does resistors. In its essentials a condenser consists of two metallic plates facing one another but separated by some substance which will not conduct electricity. This insulating material, called the *dielectric*, profoundly influences the size of the

charge which can be held by the capacitor. In the tuning condensers of radio sets the dielectric is nothing but air!

The "plates" of tubular condensers are usually long strips of tin-foil, and the dielectric which separates them is waxed paper. The whole is rolled up tightly and packed in a cardboard tube to make a compact unit. Sometimes a black band is printed on one end of the cardboard tube of a paper capacitor. The lead from this end should be connected to the grounded, or negative, side of the circuit for shielding purposes.

The small square capacitors contain brass or aluminum plates separated by thin sheets of mica. Mica condensers, as these capacitors are called, are encased in bakelite to protect them from moisture.

You have undoubtedly observed that certain tubular condensers have the word "Electrolytic" stamped on them, and also that the leads are designated as positive (+) and negative (—). In some cases the correct polarity is indicated by red and black lead wires: the red being positive, the black negative. These capacitors are made by a process of *electrolysis* which coats the aluminum-foil plates with a thin film of aluminum oxide which serves as the dielectric. When using electrolytic condensers the indicated polarity of the leads must be observed, else the capacitor will be destroyed.

Most condensers have a maximum voltage rating printed on them. A capacitor may be ruined if this voltage be exceeded. Moreover, the rating should be three or four times the steady d-c potential applied to the plates of the capacitor, especially if inductive devices such as chokes or transformers be present in the circuit.

The standard unit of *capacitance* is the *farad*. This is too big a unit for practical purposes, so most of the capacitors in our collection of parts obtained from an amplifier or radio set will be rated in *microfarads* (μf) or *micromicrofarads* ($\mu\mu\text{f}$). A microfarad is one millionth farad. A micromicrofarad is one millionth microfarad (one hundred-billionth of a farad).

Capacitor Tests

A color code is often used to designate the capacity of mica condensers. The colors have the same numerical significance as in resistor ratings, but the number should be followed by the word "micromicrofarads" instead of "ohms." The sequence of the three colored dots is frequently indicated by an arrow.

We shall not attempt to determine the exact capacity values of condensers, for that would require the use of an expensive a-c bridge. It serves our purpose.

(Continued on page 35)

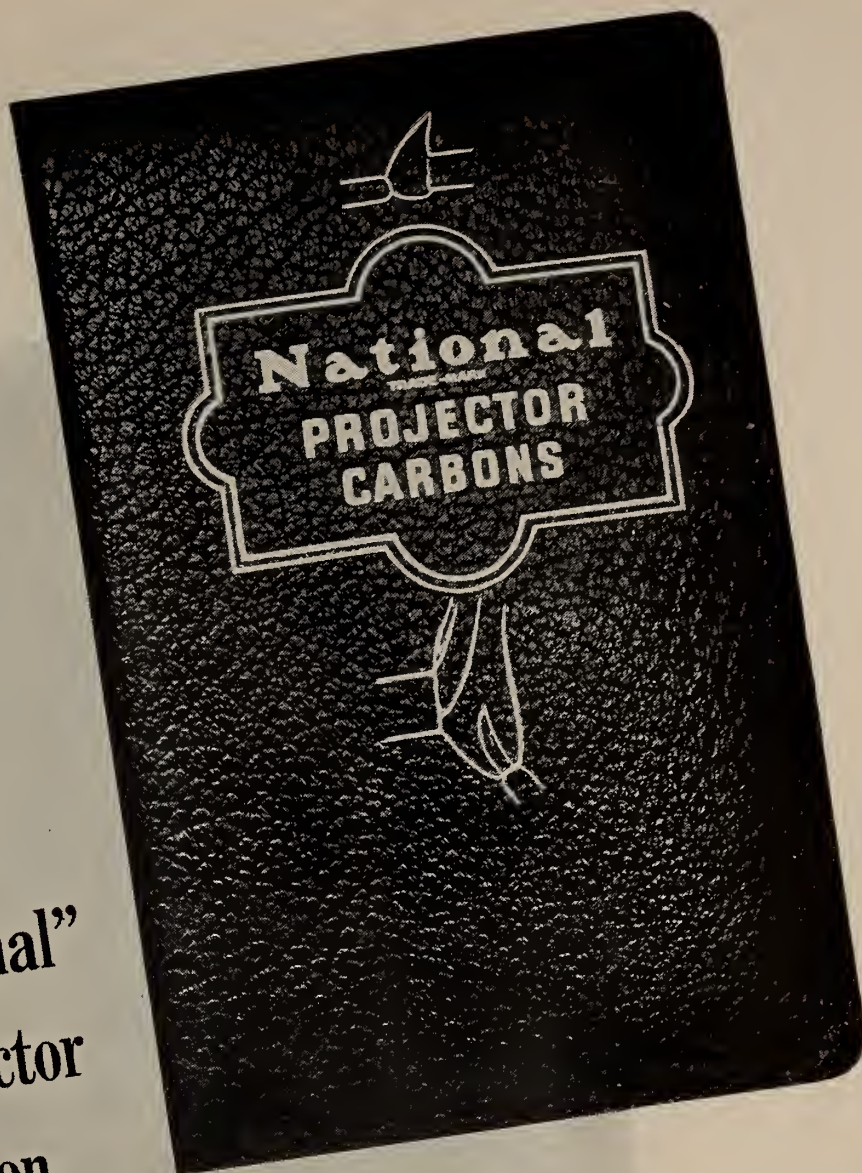
¹ See "Non-Synchronous Disc Reproduction" by R. A. Mitchell; 1P for April, 1948, p. 16.

TABLE A. RMA color code chart.

COLOR	FIRST FIGURE	SECOND FIGURE	ZEROS ANNEXED TO FIRST TWO FIGURES	TOLERANCE
Black	—	0	(None)	—
Brown	1	1	0	1%
Red	2	2	00	2%
Orange	3	3	000	3%
Yellow	4	4	0,000	4%
Green	5	5	00,000	—
Blue	6	6	000,000	—
Purple	7	7	0,000,000	—
Gray	8	8	00,000,000	—
White	9	9	000,000,000	—
Gold	—	—	—	5%
Silver	—	—	—	10%
No Color	—	—	—	20%

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FOREWORD: Eighteen months ago it was revealed exclusively by IP* that film manufacturers, notably Eastman Kodak Company, had developed an acetate film support to the point where it could challenge the long-standing supremacy of nitrate film for use as release print positive. Subsequent developments, including the circulation of several feature-length releases on acetate stock, induced widespread comment reflecting sharply conflicting opinions among projectionists concerning the relative merits of these two film supports.

Although the new acetate base won some degree of acceptance, projectionist opinion in the main was distinctly unfavorable. The situation was not aided by the rather inept manner in which the first acetate prints were distributed, with many theatres not even having the proper splicing fluid on hand and thus sustaining a

series of delays and damaging film breaks during performances. The overall picture was one of confusion compounded largely of a lack of information about and the difficulty experienced in handling the new film stock.

During the past year further improvement in the quality of this new acetate base and the assurance of greatly increased production made it obvious that the days of nitrate release prints were numbered. Because of the prime importance of this topic to projectionists in particular and to the industry in general, IP held it to be imperative that all the facts relative to the situation be thoroughly investigated and weighed objectively by means of an impartial independent survey. The results of such a survey are given in the appended article.

* "Acetate Stock to Supplant Nitrate," by Henry B. Sellwood; IP June, 1947, p. 5.

Safety Film: Projection Factors

By HENRY B. SELLWOOD

SAFETY Film for release print positives has definitely arrived and it is only a question of the length of time required for the expansion of present manufacturing facilities until it supplants the nitrate release prints now used almost exclusively in the professional motion picture field. Moreover, this new Safety Film need not be the beneficiary of any indulgence by its users, for there exists ample evidence to warrant the belief that in terms of the printing, processing and projection operations it compares favorably in every important respect with nitrate stock.

This is the considered opinion of the writer following an exhaustive investigation which included the observance of every procedural step incident to all three operations aforementioned, in addition to the examination of all available data at the manufacturing end.

Inclusive Investigation Made

This latter activity was made possible through the cooperation of Eastman Kodak Company in making available all facilities of Kodak Research Laboratories for a thorough-going, on-the-spot independent checking of all test data from its laboratories and from theatres of varying classification as to run, physical characteristics, operational procedure and type of projection equipment used.

No restrictions of any sort were imposed as to type or variety of tests in either laboratory or theatre, and it is the writer's belief that the data thus adduced would match almost exactly the conclusions that would be reached by any other impartial observer amid different yet comparable surroundings.¹

A word anent correct nomenclature. The new acetate film is known in the laboratory as "High Acetyl Film 5302," in commercial circles as "Release Positive Safety Film," while operational crews refer to it simply as "Safety Film." This latter term is used throughout this article.

Projectionists in general seldom concern themselves with the various phases of processing and printing of motion picture film, yet these production steps have a very important bearing upon the quality of the image that is projected onto a theatre screen.

Important Processing Factors

In processing, for example, the degree of swelling of the film which occurs during the developing step is of prime importance. If the longitudinal swell is too rapid or too great, some processing machines encounter trouble from excessive slackness which allows the film to be displaced on the bottom rollers. Likewise, excessive swelling during development may result in correspondingly excessive shrinkage at the beginning of the drying operation.

This has been a difficulty with previous safety films, not only because of the magnitude of swelling but also because of the very rapid rate of shrinkage of the Safety Film upon drying, causing rapid building up of tension in a critical area.

Of importance also is any tendency of the film to curl too highly negative (away from the emulsion) at the beginning of drying, or too highly positive (toward the emulsion) when completely dry.

The new Safety Film, while exhibiting an appreciable amount of swelling, has a comparatively slow rate of shrinkage upon drying, which tends to reduce the possibility of excessive operating tensions. Tests carried out in two commercial laboratories, each test involving several thousand feet of film, gave no indication on any of the machines of greater tension than normal (Table A). Likewise, in none of the tests did the swelling during development cause difficulty from slackness.

Duplitzed Film Processes

There exists a widespread misconception regarding the nature of the film support used for various color processes, namely, Trucolor, Cinecolor and Magnacolor. All three of these processes employ duplitzed cine film which carries emulsion on *both* front and back surfaces. However, and this is important, of these three *only* Trucolor releases are printed on acetate safety stock, the other two employing standard nitrate release positive. Trucolor prints (distributed by Republic Pictures) has had first call upon practically all the acetate film available up to this time.

Oddly enough, and seemingly indicative of the power of suggestion, projec-

TABLE A. Results of processing tests of safety film in commercial laboratories.

Laboratory	Machine Threading Length	Drying Conditions	Approximate Feet of Test	Film Curl at Rewind	Difficulties
A	1,750 feet	77°F. - 42% R.H.	21,000	+ .05"	None
B	2,120 feet	63°F. - 60% R.H.	12,000	+ .14"	None

¹ As a matter of fact, this new acetate film has never been cloaked in secrecy. A straightforward exposition of the relative merits of this film base and standard nitrate stock was given before the Spring 1948 convention of the SMPE and is now on view for all the world to see in the October issue of the Society's Journal: "Improved Safety Motion Picture Film Support," by Charles R. Fordyce, p. 331.

tionists have been splicing Trucolor Safety Film prints for several years now without any audible criticism anent the difficulty of effecting a satisfactory join—in addition, of course, to the various Safety Film release prints used during the war years. But once IP announced the imminent expanded use of Safety Film, mentioning Trucolor in passing, this type of print was repeatedly cited as being difficult to splice.

That duplitzed film requires more care in splicing than does a single-emulsion support is obvious to even a novice projectionist. Also, double-emulsion film occasions some difficulty with respect to focus drift, image flutter, and the embossing of both frame and image. These shortcomings are inherent in the process itself, especially in the requisite laboratory procedure (as is the case with any relatively new process) and have little relation to the type of film base used. Of these duplitzed film supports, more anon.

Projectionist comment anent the new Safety Film to date, on a comparative basis with nitrate stock, has been concentrated upon (1) tear strength, particularly at the perforations; (2) wearing quality; (3) light transmission ability; (4) image focusing, and, most important of all, (5) the splicing of both single- and double-emulsion prints.

Comparative Susceptibility to Damage

Widely prevalent among projectionists is the opinion that Safety Film is more susceptible to tearing and other damage while in transit through the projector than is nitrate stock. IP's own contributing editor, Robert A. Mitchell, has stressed the point that while a very good case might be made out for Safety Film in comparative tests under ideal conditions—meaning tip-top equipment manned by an alert projection crew—the base would tear rather readily in subsequent-run theatres.

This opinion invites—in fact, requires—consideration of various aspects of the matter, such as flexibility, shrinkage characteristics, susceptibility to brittle-

ness, and, of the utmost importance, the condition of the projector mechanism, with special emphasis upon the degree of sprocket wear and gate and takeup tension.

Worn and maladjusted projection equipment is not selective on the score of damaging film, as is eloquently testified to by the mass of nitrate stock that is damaged daily at present. The various factors which affect profoundly the physical condition of film stock were enumerated in fulsome measure in IP only last month.² There is no known type of film support that can withstand the ravages of defective or maladjusted projection equipment.

There is no disposition in any responsible quarter to invest Safety Film with mechanical qualities comparable in every respect with those of nitrate stock—that is, if the sole criterion be the readings obtained from a conventional laboratory test of such properties. Just such data is contained in Table B, to which is appended comment explanatory of the nature of the tests employed.

With special reference to the last column in Table B, which reflects considerable variance in the respective tear strengths of Safety and nitrate film supports, it must be remembered that the actual wearing strength of film depends upon a balance of physical properties in which the tear might or might not prove to be critical.

Combination Test Release Prints

The writer examined more than 80 lengthy strips from various release prints in which both nitrate and Safety Film were used in alternate double reels (thus insuring use in both projectors in a variety of theatres), without finding any evidence that the critical stage in terms of either tear strength or over-all wearing quality was reached.

The average number of runs for these strips was 292, which figure exceeds by a substantial margin the 250 runs generally regarded as the average economi-

² "Causes and Prevention of Damage to 35-mm Theatre Release Prints"; IP for October, 1948, p. 5.

TABLE B. Mechanical properties of Eastman motion picture positive film base.
(70° F.—50% Relative Humidity)

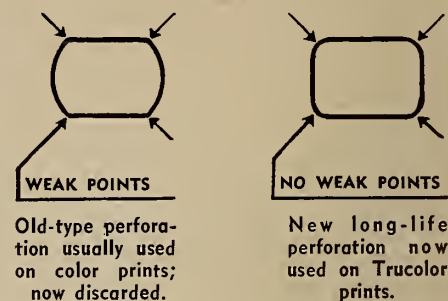
Material	Machine Direction	Tensile Strength lbs./sq. in.	Young's Modulus 10 ⁵ lbs./sq. in.	Cold Flow, %	Flexibility, (Schepper) Folds	Tear Strength, (Thwing), gms.
High Acetyl Safety Base	Length	14,500	5.54	0.51	14	43
	Width	13,000	5.00	0.63	15	46
Nitrate Base	Length	15,800	6.99	0.42	15	59
	Width	13,400	6.05	0.58	16	66

NOTES: Young's Modulus is a measure of the stiffness and rigidity of the support and is important in terms of resistance to temporary or permanent deformation.

Cold flow characteristics represent the tendency of the material to undergo permanent deformation under stress.

Flexibility is important in general handling behavior.

FIGURE 1



cally useful life of release prints. This would seem to indicate that the mechanical qualities of Safety Film are such as to enable it to at least match the economic life span of nitrate stock.

The tear strength figures given in Table B represent the resistance to continuing the tear *after it is started* and do not necessarily indicate comparative resistance to *starting a tear* on undamaged film.

Shrinkage Characteristics Important

By far the greatest amount of film tearing occurs at the perforations. In the past Safety Film, notable Trucolor and other duplitzed prints, has been handicapped in this respect by reason of several factors. Registration requisites in the printing process required a special type of perforation which exhibited definite weakness during projection, due largely to the much lower shrinkage characteristic of Safety Film over nitrate base, which in turn is related to sprocket dimensions affecting correct tooth engagement with the perforations.

Shrinkage characteristics of film is an important factor on those projectors which still use the old 0.935" intermittent sprockets, which give best mechanical wearing results with film which has undergone a shrinkage of as much as 1%. The lower shrinkage of Safety Film, therefore, is a disadvantage in this respect; but on all projectors which use the new standard intermittent sprockets of 0.943" this disadvantage of low shrinkage does not exist: in fact, the use of the 0.943" sprocket will enable Safety Film to exceed by a considerable extent the wearing quality of nitrate stock on the old 0.935" sprocket.

Projector Mechanism Tensions

Illustrative of two types of perforations is Fig. 1, which reflects the change effected in Trucolor acetate prints. Considerable film damage was experienced with the type of perforation shown at the left, due almost wholly to faulty sprocket tooth engagement and to improper projector mechanism tensions exerted by the film gate and the takeup. All Trucolor Safety Film release prints now use the rectangular type of perforation shown

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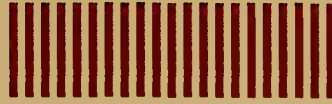
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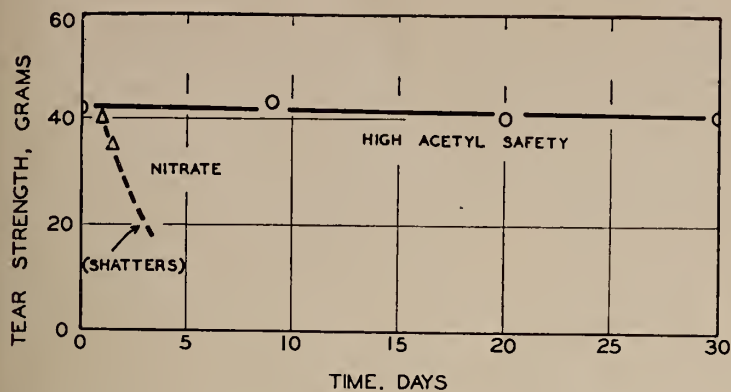


FIGURE 2
Illustrating the relative tear strength of both safety and nitrate film at 100° C. for definite time periods.

at the right in Fig. 1, which adds considerable strength to the corners.

Projector gate and takeup tensions are vitally important factors in the life of any film print. Tests indicate that the number of film passages varies from about 300 with a gate tension of 30 ounces to more than 3,000 at 8 ounces, with the latter not being run anywhere near to breakdown.

In this same test no difference in the steadiness of the image was noted with tension greater than 4 ounces; but below this point there was definite unsteadiness. A survey of a number of theatre projectors showed gate tensions ranging from about 20 ounces to about 10 ounces. These two extremes in tension produce a *five-fold change in the wear-life of film!*

Safety Film actually has a lower specific gravity than nitrate stock, and this, coupled with the much lower shrinkage in time of the former, requires careful attention to gate tension by projectionists. The correct method for ascertaining gate tension was detailed in IP recently.²

The passage of time (aging characteristics) is a very important element in the comparative evaluation of different types of film support. The chemical stability of cellulose derivatives is best measured by their resistance to viscosity degradation, which has an important bearing upon continuing pliability and resistance to brittleness.

Of special interest to those concerned with the wearing quality of Safety Film as compared with nitrate stock is Fig. 2, which reflects loss of viscosity in both film supports under accelerated aging tests at an elevated temperature for given periods of time. This figure is especially significant because it relates to two important factors in the projection process—elevated temperature (comparable with sustained heat from a carbon arc) and a time period of only a few days (comparable with subsequent-run theatre showings).

The tear strength values given in Fig. 2 eloquently express the comparative merits of Safety and nitrate film supports. It will be noted that the nitrate

support deteriorates rapidly under the treatment detailed in Fig. 2.

On the basis of all laboratory and theatre test data, Safety Film, while of a somewhat lower initial tear value than nitrate stock, has demonstrated mechanical qualities which will enable it to

TABLE C. Comparative projection quality of safety and of nitrate positive film. Arc intensity: 175 amperes.

SCREEN QUALITY	SAFETY	NITRATE
Original Sharpness and Definition	OK	OK
Focus Drift	Normal	Normal
Tendency to Image Flutter	Slight	Slight
Tendency to In-and-Out of Focus	Slight	Slight
FILM APPEARANCE		
Frame Embossing	Very Slight	Slight
Image Embossing	Very Slight	Very Slight

render wholly satisfactory service for the normal economic life span of release prints. Considering its lower shrinkage characteristic and the rapidly widening use of the new standard 0.943" sprocket, it may be expected to at least equal the performance of nitrate stock. Incidentally, Trucolor acetate stock is now regarded by competent technicians as the best wearing stock extant.

The question of the respective light transmission abilities of Safety and nitrate film may be disposed of very simply by reference to Fig. 3, which shows the absorption character of both supports to a very wide range of light quality. These curves, plotted from data checked by the writer, would seem to effectively dispose of this question.

Projection Test Run Data

Similarly, with respect to reported difficulty in focusing Safety Film, Table C gives the results of a series of test runs of both Safety and nitrate film on a Simplex E-7 projector (using the old-type 0.935" intermittent sprocket): projection throw—157 feet; screen size—30 by 40 feet; arc data—13.6-mm positive carbon pulling 175 amperes; and an Alko No. 3966 heat-absorbing glass filter was employed.

In this test both the Safety and nitrate films were nearly identical in behavior, although the Safety Film showed somewhat less embossing effect.

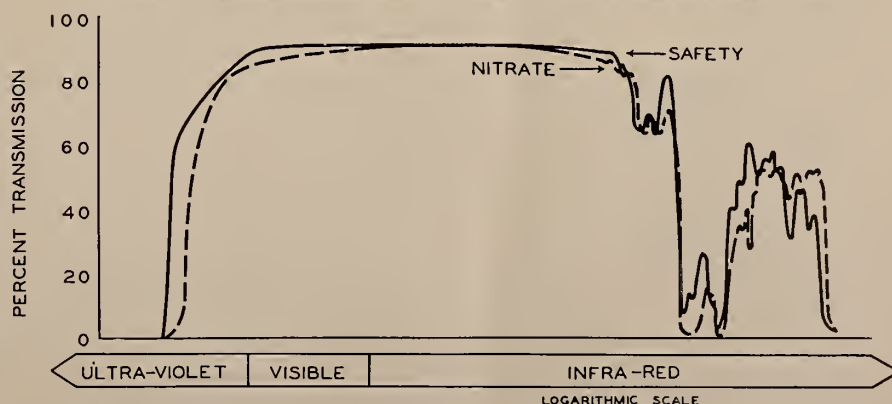
These findings are not applicable to duplitzed release prints (Trucolor, Mag-nacolor, Cinecolor, etc.) which, because of the inherent nature of the processes as explained previously, offer rather more difficulty in focusing. A different notch on the projection lens barrel, the product of experience, should be made as a guide for focusing such prints.

On the score of reaction to changes in temperature and relative humidity, Safety Film exhibits the same characteristics as nitrate stock. This is wholly understandable in view of the fact that the surface hardness of both supports is about the same, reflecting the use of exactly the same emulsion coating in both cases, with only the base having been changed. This circumstance applies with equal force to the question of sound transmission quality, which is the same in both instances.

Splicing Safety Film

The bulk of projectionist comment on this new Safety Film (more than 90% of all reports from the field) has reflected the opinion that this support is very difficult to splice. This opinion was spawned

FIGURE 3. Light transmission quality plotted for both nitrate and safety film.



and effectively nurtured by the ineptness which marked the introduction of the first Safety Film release prints in the theatre field: no detailed instructions for handling and, almost unbelievable, no proper cement for splicing. Result: much confusion and a black eye for the new film base.

The matter of attaining a satisfactory splice with Safety Film revolves about the twin factors of the proper ingredients for the solvent and correct operational procedure. These two requisites being satisfied, no difficulty should be experienced in making a join every bit as good as a satisfactory nitrate splice.

The writer personally made more than

40 splices with Safety Film—including several joins of acetate to nitrate stock—and in not a single instance was the bond inferior to the best splice made with nitrate film. Since the proper solvent is now generally available for all theatres, the sole remaining consideration is correct procedure.

Procedure Governs Results

Bearing on this point is the accompanying illustrated instruction chart (Fig. 4) which not only conveys information relative to the fundamental structure of the film support but also details correct splicing procedure.

A razor blade is not considered to be a

desirable film scraping medium. Its use creates rather than diminishes splicing trouble.

Of major importance is the condition of the splicer used. Using the Griswold splicer as an example, make certain that the center bar (shear plate) is not etched, because this etching will tend to tear the corners of the film. Frequent adjustment of this splicer is advisable because of the shear blade positioning: the best check is with a new unit, although this may not always be practicable.

Highly important is the frequent substitution of a fresh scraping blade. The blade on a Griswold splicer may be turned frequently to offer eight different scraping surfaces. About 25 scrapes per surface is the maximum number that should be made before the blade is turned. When all eight blade surfaces have thus been utilized (200 scrapes) a new blade should be inserted. Spare blades should always be on hand.

It is advisable to work from the center of the film frame toward each edge, rather than to make one continuous scrape the width of the frame, so as to avoid the errors shown in Fig. 4. After the emulsion has been removed, be sure to scrape off the invisible binder layer (B in Fig. 4) until the rough white surface of the base evidences no gloss by reflected light. It is especially important that the area around the perforations and at the ends of the film be perfectly clean.

After the shearing operation, lift the splicer clamp just a trifle for applying the cement, thus keeping the plate as clean as possible. Apply the cement in one firm, continuous stroke with the brush, as opposed to a "lathering" up-and-down motion. This latter tactic utilizes excess cement and will only cause trouble, usually a "bumpy" patch.

Once the cement is applied, it is important that the pressure clamp be brought down *immediately*: lower it slowly but firmly instead of with an abrupt clamping-down, which tends to splash the cement and thicken the splice.


Hold the pressure clamp down for not less than 10 seconds: additional time will not compensate for previous procedural errors in terms of effecting a stronger bind. Upon releasing the press clamp wipe off any excess cement from the splice itself and the center splicer bar.

Splicing Duplitized Prints

The removal of the sub-layer (B in Fig. 4) is somewhat more critical on Safety than on nitrate base and requires close attention on the part of the projectionist. Duplitized film, whether Safety or nitrate, has emulsion on *both* front and back surfaces and is much more difficult to splice than single-coated stock. All
(Continued in col. 1, next page)

FIG. 4. A highly important element in the projection process.

INSTRUCTION CHART ON SPLICING



A good ciné splice is a WELD which joins two like surfaces together. To do this, the film base must be prepared by removing the layers covering it. The film has more layers than is commonly known. First, there is the emulsion layer A, then a thin invisible binder layer B, which binds the emulsion to the base, and then the base itself C which is about one two-hundredth of an inch in thickness. The back of the film may also have a layer D of oil or of residue from processing which can be removed by delicate scraping or by wiping with a cloth wetted with alcohol.

GOOD AND BAD SPLICES



This is bad. The emulsion has not been removed completely.



This is also undesirable but may hold for a while. The emulsion has been removed but the invisible layer and the deposit on the back of the film remain.



This is weak. Careless scraping has gouged the film. This splice will eventually break in this weakened area.



This is best. Both emulsion and invisible layers have been removed and the deposit on the back scraped away. This permits a perfect weld between the two surfaces.



Too little cement causes a starved joint that will soon separate. Inadequate pressure in splicing also produces this condition.



Too much cement makes the splice buckle and hence produces a noticeable effect on the screen.

In splicing, close the clamp immediately after applying cement to the scraped portion. A WELD will form only when the joint is wet.

The above diagrams show the film thickness exaggerated to a much greater degree than the width of the splice for purposes of illustration.

Looking Ahead at Color

By JOHN JENKINS

These notes from the production front are published here through the courtesy of our contemporary, International Photographer.

ONE of the next big forward steps in color photography will be a one-layer black emulsion, the black absorbing all the light that reaches the emulsion. It will be fast, faster than any film obtainable for black-and-white. The processing will be simple, as simple as washing or bleaching out a destroyed dye and fixing the remaining dye.

The film from the camera will be positive when it is processed and prints will be the same. Printing will correct variations in color temperature and density.

Six- or seven-color separation will produce more natural tones than three-color separation. In the one-layer method six-color separation is no more trouble than three, and the pictures would be much better.

How the Process Works

The making of this emulsion naturally will require some experimentation, but the principles used are simple. Most dyes are sensitive to light—and can be made extremely so. Here's how it works:

Six dyes properly placed in the spectrum are combined, thus producing a black. Eliminating any one or combination of the dyes will produce a color. But we are now dealing with sensitized dye. Assume that a beam of red light hits the black emulsion: only the red dye is transparent to the red light.

SAFETY FILM: PROJECTION DATA

duplitzed films (Trucolor, Magnacolor, Cinecolor, etc.) must have *both* emulsions and *both* sub-bases scraped on *both* ends of the film to be spliced before a secure join can be made.

Several film cements designed specifically for *both* Safety and nitrate film are now on the market, and it might be well for the projectionist to test all of them before exercising his preference for continual use. A word of caution: buy the smallest available quantity of film cement at one time so as to insure constant freshness. Film cement is subject to chemical change with time which has a very definite bearing on its effectiveness. Keep the cement bottle covered at all times.

This, then, is the story on the new Safety Film as compared with standard nitrate stock, with the findings reported herein being based on a first-hand, impartial investigation by an IP representative. Projectionists and others having something interesting to say relative to their experience with Safety Film are urged to avail themselves of IP's columns in which to say it.

All the others tend to stop or absorb the red. Thus work is performed on all the dye but the red, and the rest are upset, which causes them to bleach or wash out of the film later, in processing leaving the area red.

There's nothing new about these sensitizers; they're as old as panchromatic film, only in silver emulsion the energy absorbed by the dye is transferred to the silver. When we eliminate the silver emulsion, which is almost white and reflects most of the light from its front surface, the process is greatly speeded up. Then when the dye has only to upset itself from the light and doesn't have to knock over some silver salts, the process is speeded up that much more. Emulsion speeds eight times faster than those to

which we are accustomed are possible!

Simple processes grow out of complex ones as a general rule, which is probably the reason this method has not yet been introduced.

New Emulsion Much Thinner

The new emulsion will be a much thinner layer. Because of this, its black color and absence of silver grain, it will be capable of recording an image far beyond the present standards of sharpness. Sound recording will quickly take advantage of the increased speed and absence of grain. Cameramen might have to stop down to f/5.6 inside, so they would have enough light to see through their finders. (I'll let someone else figure the finder to see in the dark.)

By taking advantage of the black emulsion, a density range far longer than any black-and-white emulsion can be produced for photographing, but a shorter standard density range film would be required for printing.

20 Years of Theatre Sound System Servicing†

By EDWARD S. SEELEY

Chief Engineer, Altec Service Corporation

The history of the sound motion picture industry is told from the point of view of the service organization. Particular emphasis is given to the part played by the service forces in the steady improvement of sound quality to its present standard. Also discussed are possible theatre problems of the future which national service organizations will help solve.

II

FURTHER developments in recording extended the recorded frequency range. Simultaneously, systems capable of delivering the increased range to the listening public were developed. This two-front development resulted in the introduction of wide-range, high-fidelity equipment, bringing with it new problems. Again arose the necessity for additional training of service personnel in the intricacies of horn placement, draping, phasing, equalization, control of back-stage effects and other details.

Very important among the causes of poor reproduction quality in the early sound systems was flutter. Flutter is a frequency modulation or warbling of the reproduced sound caused by nonuniform velocity of the film past the light beam. Flutter was present, often to serious extent, in all film drives.

The logical first step in correction of such a condition is to measure it. Designers of new equipment had laboratory-type flutter measuring systems, but none of these was suitable for use by the serv-

ice inspectors. The need for a small portable instrument became acute, and in 1936 the TA-7421 Flutter Bridge was developed.

This instrument was small, light in weight, simple to operate and economical of cost. A large number of these instruments are still in use in this country and many foreign countries. Similar equipment was later adopted by other service organizations.

Equalization of 1-Way Systems

The Wide-Range, Microphonic and High-Fidelity systems introduced a new standard of sound quality in this rela-

(Continued on page 31)

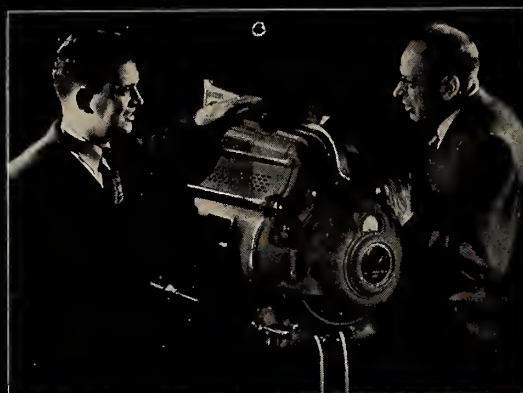
I receive several other trade magazines but I consider IP to be far and away the best and most instructive for projectionists. Actually, it is referred to as the "bible of projection" by the boys in this country. The articles and photos of new American equipment makes our mouths water, and we envy you fellows who work such gear. Guess we'll get some of this swell stuff eventually.

H. M. RICHARDS

Remuera, Auckland, New Zealand

† J. Soc. Mot. Pict. Eng., May, 1947.

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UNLIKE audio signals which contain frequency components ranging from a low value of about 20 cycles per second to a high value of about 15,000 cycles per second, video signals include a range from practically zero frequency (produced over areas where there is little variation in light intensity) to as high as 4 or more megacycles (produced over areas where there is a very rapid variation in light intensity).

It is interesting to examine the manner in which the maximum frequency required in the video signal is related to the amount of detail which is reproduced. This can be arrived at from the following considerations:

Let us assume that we wish to transmit a picture in which the same resolution or detail is desired in the horizontal direction as in the vertical direction. In the vertical direction we have a total of 525 lines or 525 elements. Since a horizontal line is 4/3 times as long as a vertical line (the picture is 4/3 times as wide as it is long), it follows that there are 4/3 as many elements in a horizontal line as there are in a vertical line. This makes a total of $525 \times 525 \times 4/3$ or 367,500 elements in the complete picture.

Since we wish to calculate the maximum frequency required to reproduce the light and dark variations over each one of these 367,500 elements, let us assume that alternate elements in the picture are black and white so that the image resembles a checkerboard pattern. This type of scene requires the highest possible frequency for faithful reproduction because of the rapid variation in light intensity as the beam goes from one element to the next.

The exact opposite of this type of scene would be one which was uniform over its entire area, for in this case it would be necessary for the system to transmit only very low frequencies. For the checkerboard pattern under discussion, the variation from black to white in scanning two adjacent elements requires a certain amount of time. This time period represents the duration of one complete cycle, and one divided by this number represents the highest frequency which must be transmitted.

Time Interval Per Cycle

Let us calculate this time interval required for the beam to scan two adjacent black-and-white elements. Since there are 367,500 elements in a complete picture and it requires 1/30 second to transmit this picture, the time allotted to the transmission of information on two elements (1 cycle) is equal to

$$\frac{2\sqrt{2} \times 1 \text{ second}}{367,500 \quad 30 \text{ cycles}} =$$

TELEVISION:

How it Works

By WILLIAM BOUIE

The fifth and concluding article in a series on television image propagation and reception, based on one chapter in the book of the same name published by the John F. Rider organization.

1 second
3,900,000 cycles

The constant, $\sqrt{2}$, is determined by several factors, the most important of which is the spot diameter. The frequency generated when the scanning beam passes over these two elements is thus equal to 3,900,000 cycles per second, or 3.9 megacycles.

As we have previously seen, the maximum frequency which is present in the video signal is related directly to the amount of detail required in the image. It has been found that for the smaller picture tubes satisfactory detail is obtained when frequency variations up to 2.5 megacycles are transmitted and that little is gained by transmitting the h-f components produced in the scanning at

the camera tube. However, where a comparatively large picture tube is used, additional detail and a finer image can be produced by transmitting frequency components ranging up to about 4 megacycles.

The Modulated Wave

In previous sections we have described the video wave produced when a scene is scanned and the modifications which are made in this wave in order to provide for both line and field synchronization. We now will consider the makeup of the modulated wave which is produced when this video wave modulates a h-f carrier.

First let us review the result of amplitude-modulating a carrier with a conventional audio signal. As Fig. 20 (A) shows, if we amplitude-modulate a 1000-kc carrier with an audio signal which contains frequency components ranging up to 5 kc, then the resulting modulated wave contains, in addition to the carrier frequency, new frequencies which extend to the limits of 5 kc below the carrier frequency and 5 kc above it.

In other words, the process of amplitude-modulating the carrier results in the introduction of two sets of sidebands which extend outward from the carrier to a value equal to the highest frequency in the modulating wave.

The sideband which contains the frequencies lower than the carrier frequency is called the "lower sideband," and that which contains the frequencies higher than the carrier is called the "upper sideband."

It would be impossible to use a broadcast-band carrier for Tv work. This can be seen from the fact that, unlike sound, the video modulating frequencies would themselves be higher than the carrier frequency.

In order to make the modulation process work, it is necessary that the carrier frequency be at least several times the

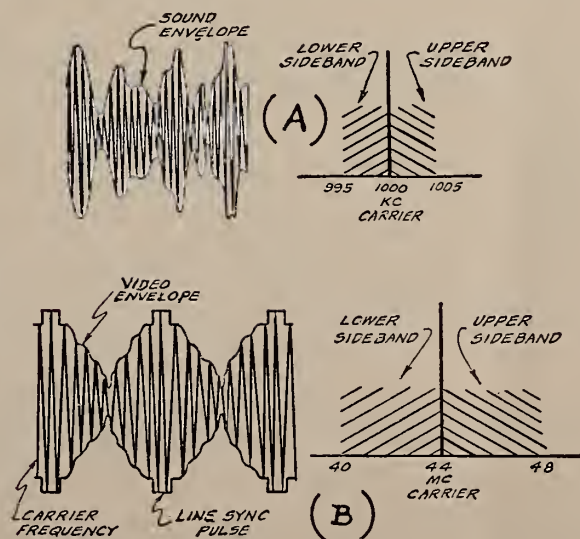


FIGURE 20

The sidebands in an A-M sound signal occupy a bandwidth of only about 10 kc; whereas the sidebands in a television signal require a bandwidth of about 8 mc.

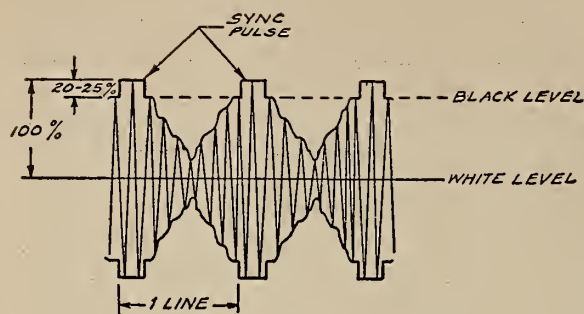


FIGURE 21

A video wave with negative modulation. The sync pulses are located in the blacker-than-black region and occupy from 20% to 25% of the maximum carrier amplitude.

highest frequency of modulation. For this reason the carrier frequency in Tv must be several times as high as the maximum video frequency, or several times 4 mc. Actually, the carrier frequencies which have been chosen for Tv are at least ten times the highest video frequency, since the lowest carrier frequency which is being used for 525-line Tv is 44 mc.

A number of years ago carrier frequencies only a little higher than the broadcast band were assigned to experimental Tv. This merely illustrates our point, however, since those early low-definition pictures contained comparatively few elements and consequently had maximum video frequencies far below those found in present-day high-definition work.

Returning to the comparison between a broadcast-band carrier amplitude modulated by a sound wave and a modulated Tv carrier, we show in Fig. 20 (B) the wave which results when a 44-mc carrier is modulated with a video signal. As in the case of the 1000-kc carrier, the process of modulation introduces two sets of sidebands, and for the example shown the two sidebands extend to 4 mc below and 4 mc above the 44-mc carrier.

It is interesting to compare the bandwidth required for the transmission of a scene by Tv with the bandwidth required in amplitude modulated (A-M) sound broadcasting. As Fig. 20 shows, an A-M

sound broadcast requires only a 10-kc channel, whereas the Tv channel (arranged for double-sideband modulation) requires 8000 kc or 800 times as much space as the sound channel.

Although it is possible to locate approximately 100 sound channels in the broadcast band, it would require more than 8 times the space provided by the entire broadcast band for the transmission of a single Tv channel with double-sideband modulation. The large amount of the radio spectrum required for Tv is one of the reasons for the choice of the ultra-high frequency range for Tv.

Positive and Negative Modulation

In discussing video signals it was pointed out that the video signal is said to have a positive or negative picture polarity depending upon whether the changes from the black level take place in a positive or a negative direction, respectively. In modulation we run into somewhat similar terms—positive and negative modulation—which are related not to the polarity of the video signal but to the modulated wave itself.

A Tv carrier is said to have positive modulation when an increase in carrier amplitude corresponds to a brighter area in the scene being scanned. Thus, for a wave with *positive* modulation, the *lowest* carrier amplitude corresponds to *black* while the maximum carrier amplitude corresponds to the brightest part of the image.

On the other hand, for negative modulation a decrease in carrier amplitude corresponds to an increase in the brightness of the image. Thus for a wave with *negative* modulation the lowest carrier amplitude corresponds to maximum white in the image, and the *highest* carrier amplitude corresponds to *black*.

Because negative modulation offers certain advantages in improved performance and simplified receiver design, it is used as standard in this country. As shown in Fig. 21, the maximum amplitude of the carrier is used for the synchronizing pulses and lies in the blacker-than-black region. The term "blacker-than-black" merely means that the sync signals have higher amplitude than black picture signals.

It has been found that reliable synchronization can be secured so long as the amplitude of the synchronizing pulses is from 20 to 25% of the maximum carrier amplitude. Actually, then, not more than 80% of the total carrier amplitude is available for transmitting information on the light values in the scene, the rest of the wave being used for synchronization.

Receiver Circuits: General

Having examined the fundamental principles of Tv, let us now investigate the operation of receiver circuits. To show the inter-relationship between the many components that make up a receiver, we shall break down a receiver into its major sections and later consider the functioning of these in more detail.

Figure 22 shows a block diagram of a typical Tv receiver arranged to show the general character of the signal and the function performed by each section. For convenience we shall assume that the receiver is tuned to the 44-50 mc channel. In accordance with the preceding description, this means that the frequency of the video carrier is 45.25 mc (1.25 mc

(Continued on page 33)

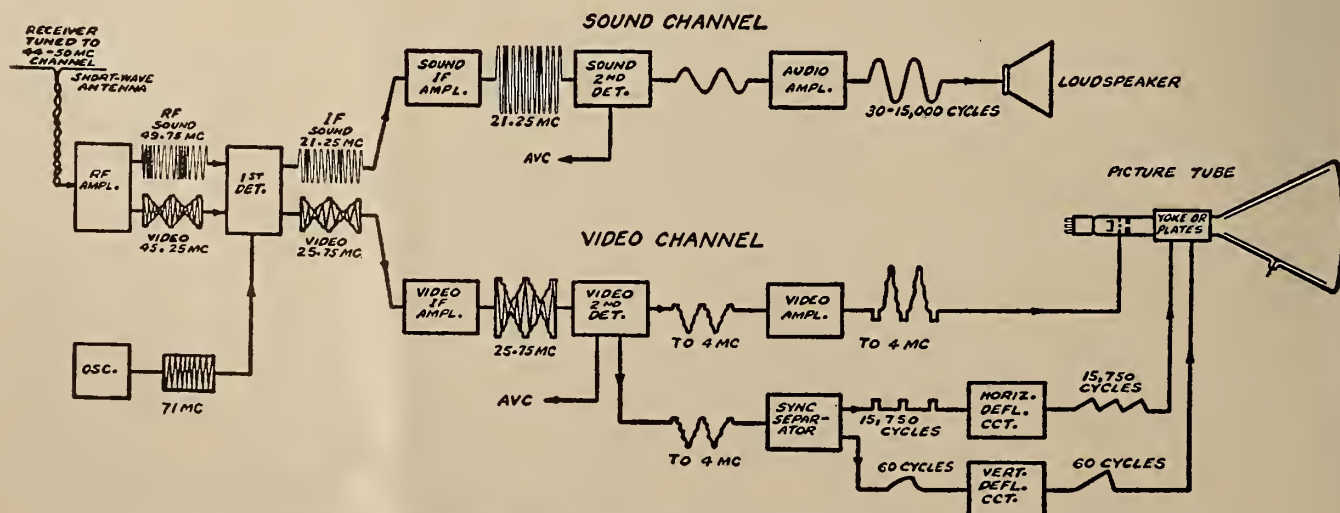


FIG. 22. Block diagram of a typical television receiver. Note changes in the signal as it passes through the receiver.



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Fundamentals of the Simplified H-I Arc

The material contained herein constitutes a chapter in the new edition of "Projector Carbon Handbook," now being distributed among projectionists by National Carbon Co.

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THE "simplified high-intensity" type d-c and the "one-kilowatt" d-c and a-c arcs with coaxial non-rotating carbons have brought to both the medium and small size theatres the same high levels of screen brightness and the same snow-white quality of light as the condenser-type high-intensity arc provides for the largest theatres.

While the lamps designed to operate these arcs are fully automatic, there are certain operating precautions with which the projectionist must be familiar to obtain maximum efficiency therefrom. The fundamental factors important to the operation of these reflector-type, high-intensity arcs are described herein, not necessarily in the order of relative importance, because any one factor, if neglected, will result in lowered efficiency of light production.

Current Change, Arc Positioning: Effect Upon Screen Light

The light source and the film aperture are placed at the two foci, F and F_1 , of the elliptical reflector, Fig. 1, which gathers the light from the crater of the positive carbon and directs it to the film aperture. The illumination of the aperture in turn is imaged on the screen by the projection lens. The path of the projected ray is from one focal point F to the margin of the mirror and to the other

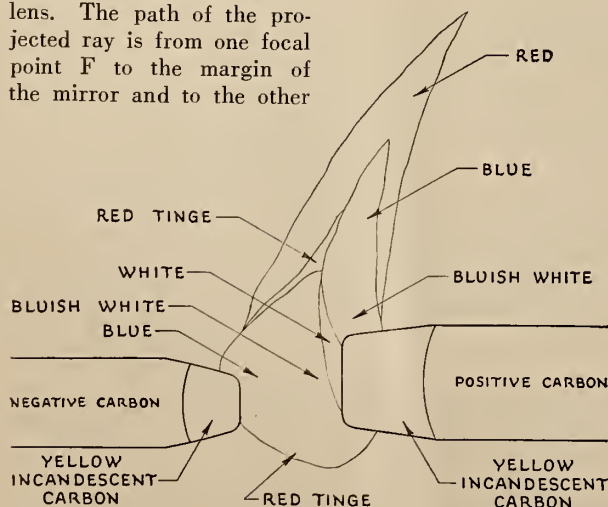
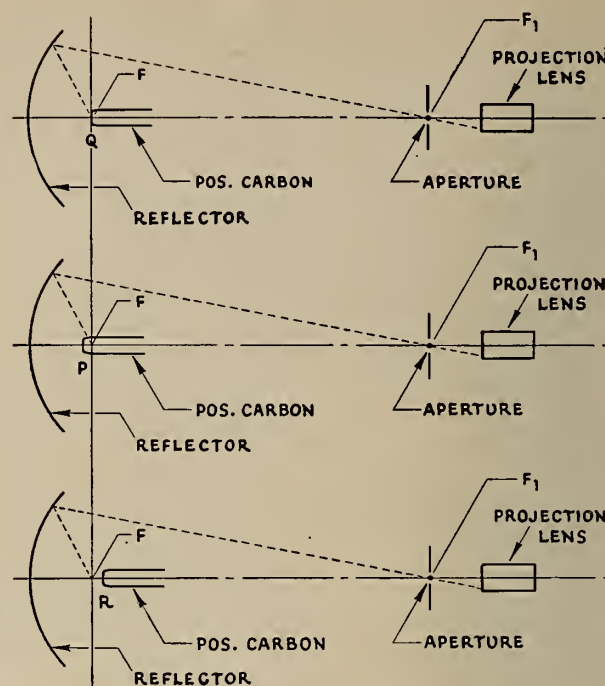


FIGURE 1

Optical system of simplified high-intensity lamp showing relation of position of positive carbon to the light ray traveling to the center of the film aperture.



focal point F_1 , which is located at the center of the aperture. Three positions of the crater of the positive carbon—namely Q, P and R—are shown by the sketches in Fig. 1.

Figure 2 is a diagram of a typical image of the simplified high-intensity arc with the colors of light indicated at various positions in the arc stream.

It can be seen in Fig. 1 that if the crater is positioned at Q, the white light from the center of the crater is focused at the center of the film aperture and projected on the screen. This is the ideal location to obtain the best quality and intensity of screen light. If the crater is moved ahead to position P, the ray traveling to the center of the aperture originates from the cooler position of the carbon back of the crater. This results in a change of color and intensity of the light at the center of the aperture

and projection screen, thus giving it a yellowish or reddish tinge. Similarly, if the carbon recedes to position R, the ray traveling to F_1 originates from the arc stream in front of the crater, which is blue in color, and the screen light is affected correspondingly.

Even within the range of allowable movement of the crater for satisfactory screen color, there are changes in total screen light and distribution of light over the screen. The relations between screen light, screen distribution, arc length, current, and arc position are shown in Figs. 3, 4 and 5. The arbitrary units assigned to the ordinates in these curves are merely illustrative; exact values are dependent on the optical system employed.

Arc Length a Vital Factor

In ordinary practice the arc length of a 7-mm positive and 6-mm negative trim is usually maintained between 0.28 and 0.31 inch. The effect upon the screen light of varying the arc length, while keeping the current constant and the positive crater at exactly the same position with respect to the reflector, is shown in Fig. 3.

It is obvious from these curves that neither the total light on the screen nor the distribution of the light is materially affected by changing the arc length from $3/16$ to $3/8$ inch, provided the current and the position of the positive carbon remain constant. If, however, the arc length is comparatively great, say $3/8$ inch or more, there is a perceptible wavering of the arc which tends to cause a fluctuation of the screen light.

If the current is increased but the

FIGURE 2
Typical image of the simplified high-intensity arc, with the colors of the produced light indicated at various positions in the arc stream. Obviously, not all these positions are within the angle of mirror pickup.

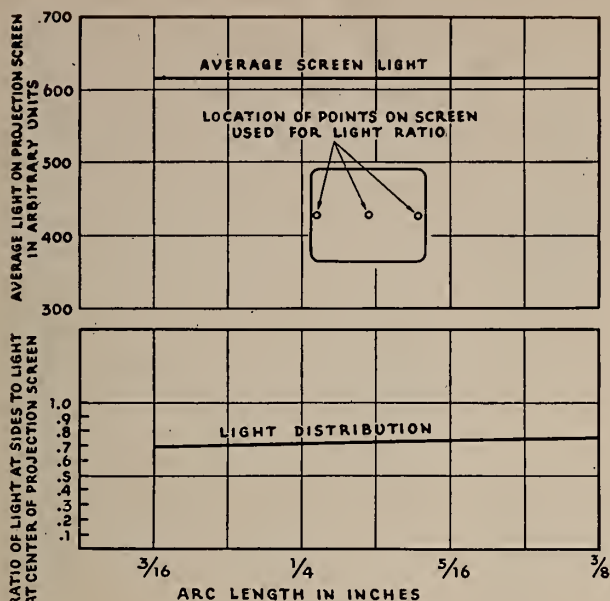


FIGURE 3

Effect of arc length upon projected screen light: 7-mm positive—6-mm negative carbons, with the positive carbon positioned 3.76 inches from the reflector, and a constant current of 45 amperes.

arc length and position of the arc with respect to the mirror are held constant, there is a very definite increase in screen light, but very little change in light distribution, as shown in Fig. 4, determined for 7-mm carbons. For an increase in current from 40 to 50 amperes, or 25%, the light on the screen is increased by 47%.

This increase in light is accompanied by an increase in crater depth and carbon consumption. If the arc current is too low, the crater is very shallow and

the light is not uniform in color. If the current is too high, the carbon consumption is excessive and the light is unsteady.

If the current and arc length are maintained constant but the arc itself is moved with respect to the reflector, the screen light and distribution vary as indicated in Fig. 5. To maintain a good distribution of light upon the screen it is necessary to hold the position of the crater within close limits.

At A in Fig. 5 the light at the sides of the screen is equal to that at the center, and the edge of the positive crater is 3.70 inches from the center of the reflector. If the arc is moved closer to the reflector, the sides of the screen become

brighter than the center, which is a very undesirable condition. If the arc is moved away from the reflector, the average light on the screen increases and the light at the center becomes brighter than at the sides until point B on the curve is attained, at which point the average light is at its maximum.

Continuing the movement of the arc away from the reflector results in a decrease in the average screen light and an increase in the contrast between the center and sides. After point C is reached, the contrast between the sides and center becomes very noticeable.

If the distance between points A and C is taken as an arbitrary range, this allows a movement of the arc over a distance of only 0.14 inch. It is therefore quite essential that the position of the arc be maintained near the center of these limits.

It has been found by measurement that when the 8-mm positive carbon with the 7-mm negative carbon is operated at 60 amperes, the permissible movement of the arc is increased approximately 35% over that when a 7-mm positive is employed. This is due to the larger crater opening of the 8-mm carbon.

Power Source and Arc Stability

Because the simplified high-intensity arc requires no more than 40 volts at the arc, it is not economical to use either a 115-volt d-c line or a 70-80 volt d-c generator as a source of power because of

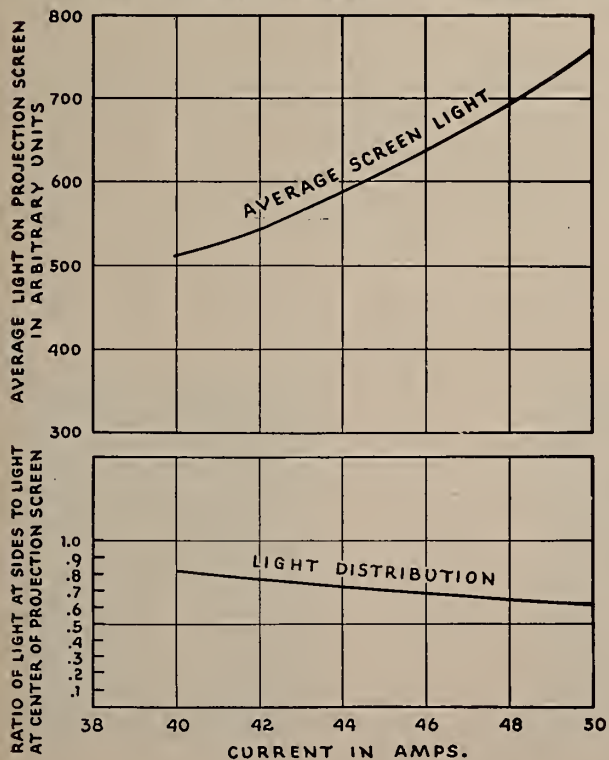


FIG. 4. Light on projection screen vs. current: 7-mm positive and 6-mm negative carbons, with a 5/16-inch arc length and the positive carbon positioned 3.76 inches from reflector.

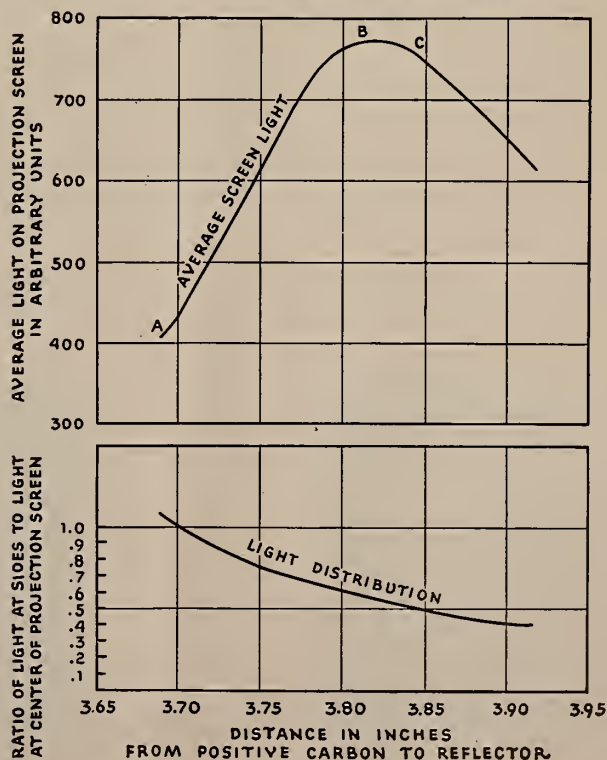


FIG. 5. Light on projection screen vs. position of arc: 7-mm positive and 6-mm negative carbons, with a 5/16-inch arc length and with the arc pulling 45 amperes.

Power Source		Momentary Arc Voltage	Momentary Arc Current
(A)	115-volt constant-voltage power line	34	45.6
(B)	45-volt constant-voltage generator	34	49.5
(C)	Generator or rectifier with falling volt-ampere curve similar to source B at and near 45 amperes	34	49.5
(D)	Generator with rising volt-ampere characteristic	34	44.4

TABLE A
Showing the effect of a decrease of 1 volt in arc voltage. Original condition: 45 amperes and 35 volts at the arc.

the large amount of power wasted in the necessary ballast. Lower voltage generators and rectifiers are available which provide a constant voltage source near enough to the arc voltage to permit the use of small ballast resistances and are characterized by a comparatively large increase of current when a small decrease of arc voltage takes place. This is a decided advantage in maintaining stability of the arc.

If for some reason there is a disturbance in the high-intensity effect—such as, for example, a decrease in the voltage drop in the crater due to poor alignment of the carbons—the resultant effect on the arc may be quite different, depending on the characteristics of the power source. Table A shows the effect of a decrease in voltage of one volt with various power sources.

With a slight increase of current in the arc, such as occurs with power source A, there would be very little tendency for the crater depth to be restored. On the other hand, if the current decreases as the arc voltage decreases, as in the case of D, the crater depth would be further diminished and the condition aggravated.

But if the power sources B or C were employed, there would be a distinct increase of current which would immediately tend to restore the proper crater depth. This in turn would increase the arc voltage and cause a restoration of

arc current, arc voltage and crater depth to their normal values.

Power source D corresponds to the series arc generator operated in the range where an increase in current produces an increase in voltage. The 70-80 volt generators of the constant-voltage

that have been developed for use with the simplified high-intensity and "one-kilo-watt" lamps.

In those instances where either straight d-c or a high voltage motor-generator set is used as a source for operating an 8-mm positive and 7-mm negative carbon trim, it is necessary, in order to obtain arc stability, to burn this trim at or near the maximum recommended current (65 amperes or above); at the same time the negative carbon burns off slightly at the top. Care should also be taken to see that the auxiliary magnets used for stabilizing the arc are of the proper strength.

Magnetic Flux Arc Stabilization

It is an established fact that every conductor carrying an electric current is surrounded by a magnetic field which

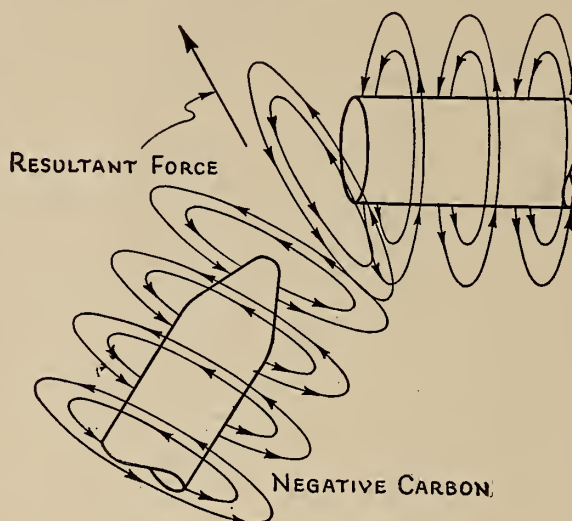


FIGURE 6

Showing the magnetic field which surrounds the carbons and the arc in a condenser-type, high-intensity arc, with the carbons set at a 45-degree angle. Compare these magnetic lines with those present in a simplified high-intensity arc of approximately 180 degrees.

type commonly used for low-intensity mirror arc or high-low reflector lamps with rotating positive carbon, are intermediate in effect between power source A and power sources B and C. Power sources B and C are typical of the units

is generated by the current. Fig. 6 illustrates the magnetic field which surrounds the carbons and the arc in a condenser-type, high-intensity lamp.

Because of the angular position of the carbons in these lamps, the magnetic

FIGURE 7

Photograph of high-intensity arc under conditions shown in Fig. 6.



FIGURE 8

Photograph of simplified high-intensity arc without an auxiliary magnet.



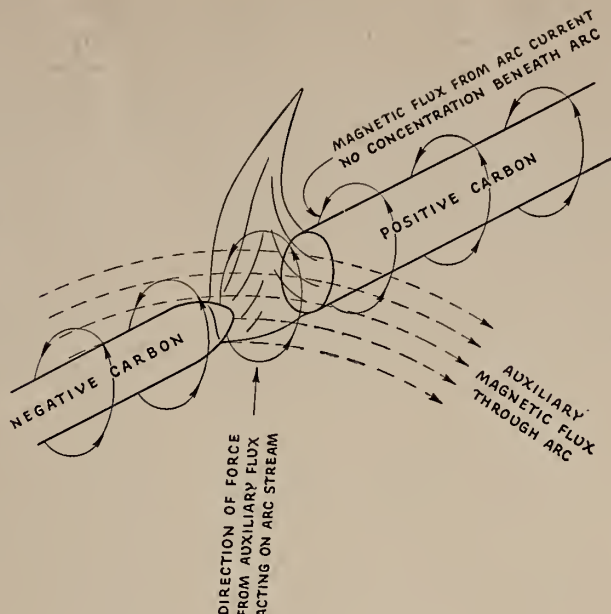
FIGURE 10

Photograph of simplified high-intensity arc with an auxiliary magnet.



FIGURE 9

As contrasted with Fig. 6, here is shown the magnetic flux produced by the auxiliary magnet used with simplified high-intensity carbon arcs positioned at approximately 180 degrees. Here the tail flame is lengthened and driven upward and forward.



lines of force generated by the current are crowded below the arc and are less dense above the arc. The resultant effect of this combination of magnetic lines is a force upward (indicated by the arrow) which, in conjunction with the natural flow of the arc stream, projects the tail flame of the arc in an upward and forward direction from the positive crater, as shown in Fig. 7.

In the simplified high-intensity type lamps where both carbons are held in a horizontal position, the magnetic lines of force are distributed uniformly around the carbons and there is no concentra-

tion of magnetic flux beneath the arc such as that which occurs when the negative carbon is inclined to the positive, as

TABLE B
Showing the various National Suprex carbon arc combinations, together with dimensions and proper current ratings.

Arc Amperage	Arc Volts	Positive Carbon "National" "Suprex" (Cored)	Negative Carbon "National" "Orotip" (Cored)
32-40	31 - 40	6mm x 12"	5mm x 9"
40-50	27.5-37	7mm x 12" or 14"	6mm x 9"
60-70	35 - 40	8mm x 12" or 14"	7mm x 9"
A.C. — "One Kilowatt" High Intensity Arcs			
52-66	18 - 22	7mm x 12" or 14" "Suprex" Cored in both holders	

SMPE 64th Convention Offered Many Fine Papers

Sixty technical papers covering the diverse technical activities of motion picture production and exhibition were presented and discussed at the week-long 64th Convention of the Society of Motion Picture Engineers held at Hotel Statler, Washington, D. C., Oct. 25-29.

Earl Sponable (20th Century-Fox) was elected president of the Society for a two-year term beginning Jan. 1 next, succeeding Loren Ryder (Paramount studios); Peter Mole (Mole-Richardson) was named executive vice-president; William C. Kunzmann (National Carbon Co.) was re-elected a vice-president; and Robert M. Corbin (Eastman Kodak Co.) was named vice-president and secretary.

Abstracts of some of the papers presented at this SMPE meeting are appended hereto:

THREE-DIMENSIONAL MOTION PICTURES

F. H. Reijnders

Veri-Vision Holdings, Delft, Holland

Three-dimensional films involve many problems not encountered in standard-type films, especially since questions of physiolo-

gy, psychology, and individual differences in observers are involved. Among these are the effects of either too pronounced or too little depth dimension.

The Veri-Vision System of making stereoptical pictures was designed to overcome these problems, particularly in the filming of close-ups and semi-close-ups. In this method, the angle between the objective axes of the camera is maintained at a constant regardless of the amount of difference in spacing between these axes. The result is

Free Film Splicing Chart

Attention is directed to the inclusion in this issue of a special business reply card which need only be detached, filled-in and deposited without postage in any mailbox in order to bring the sender a handsome wall chart which details and diagrams all the do's and don'ts for splicing both safety and nitrate film base.

Both the postcard and chart were prepared at considerable effort and expense by Eastman Kodak Co. especially for IP readers, and it is hoped that every reader will avail himself of this generous offer. Use the card now.

said to be free from the distortions normally associated with three-dimensional projection.

For viewing, a newly designed type of polarized spectacles is employed which maintains the stereoptical effect even when the head is moved to the right or to the left.

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O. C. Johnson

Westrex Corporation

A new line of theatre amplifier systems places especial attention on ease of maintenance while retaining high-quality features. A floor-mounting cabinet is used throughout, the smallest system also being available in a wall-mounting cabinet. "Dishpan" type chassis makes all wiring available from the front, the back being needed only for changing plug-in devices. The voltage amplification section is common to all sizes of amplifiers and may be replaced with only the use of a screwdriver. Other novel features are also described.

MOTION PICTURE PHOTOGRAPHY IN THE ULTRA-HIGH-SPEED RANGE

Brian O'Brien and Gordon G. Milne

University of Rochester

Motion picture photography at speeds above about 20,000 frames per second requires special methods which usually impose

one or more serious limitations on convenience or utility of the photographs. Among these limitations may be requirement for a special intermittent light source, in which case photography of self-luminous events is excluded.

Even with cameras suitable for photography of self-luminous events there may be the limitation of a small or comparatively small number of frames possible in a single run, or the photographs may be presented in a form not readily converted to a standard motion picture print. Equipment is fre-

quently non-portable, and the optical system may be limited to a small equivalent relative aperture and thus place unusual demands upon the illumination system. Finally the image quality may be and frequently is quite poor.

No system of ultra high speed motion photography appears entirely free from one or more of these limitations, but in spite of this much can be done, by proper choice and application of equipment, to obtain useful photographs of most very fast events.

The various ultra high speed systems which have been proposed were discussed,

together with the problem of illumination where exposure times must be of the order of a few microseconds or less. Some applications were illustrated by motion pictures of several extremely fast events at speeds in excess of ten million frames per second.

FILM VAULT CONSTRUCTION

John G. Bradley

Consultant, Washington, D. C.

The presently accepted commercial type of film storage vaults, as approved by the
(Continued on page 30)

SIMPLIFIED H-I CARBON ARC

the arc will go in and out of the high-intensity effect, causing current fluctuations which result in very unstable screen light.

Recommended Ratings Controlling

Table B shows the carbon trims available and the recommended current range for operation of these trims. For most efficient operation, *all carbon arc trims should be operated at or near the maximum recommended current.*

Here and there is found a projectionist who uses a trim of larger diameter than indicated in order to save trimming or cut carbon cost. By so doing he sacrifices quantity, quality and steadiness of light. Compared with other expenses in a theatre, the cost of carbons is negligible—only a few cents a day.

The product which the theatre sells to its audience is the picture on the screen. A film costing hundreds of thousands of dollars, poorly lighted, loses its effectiveness, with resultant loss of patronage. It is sound economy, therefore,

to use only the best quality of carbons, in correct combination and operated within the manufacturer's recommended current range.

Table C shows the total screen lumens as well as the foot-candles at the center of various sized screens obtainable with simplified non-rotating, high-intensity carbon arcs. The values are given for both coated and uncoated projection lenses with optical systems adjusted for 80% side-to-center distribution as well as for maximum light at the center of the screen.

TABLE III. Screen Illumination With Simplified (Non - Rotating) High - Intensity Carbon Arcs

	1Kw Arcs	Higher Powered Arcs			
Carbon Trim					
Positive	7mm x 12" or 14" "Suprex"	7mm x 12" or 14" "Suprex"	7mm x 12" or 14" "Suprex"	8mm x 12" or 14" "Suprex"	8mm x 12" or 14" "Suprex"
Negative	6mm x 9" "Orotip" C	6mm x 9" "Orotip" C	6mm x 9" "Orotip" C	7mm x 9" "Orotip" C	7mm x 9" "Orotip" C
Arc Amperes	40	42	50	60	70
Arc Volts	27.5	33	37	36	40
Lamp Optical System	Mirror 11 3/4" Dia. f2.5	Mirror 14" Dia. f2.3	Mirror 14" Dia. f2.3	Mirror 14" Dia. f2.3	Mirror 14" Dia. f2.3

5.5" E.F. f/2.5 Uncoated Projection Lens

Total Screen Lumens ¹	4600	4900	6400	7600	9600
Screen Light Distribution ²					
Side to Center	80%	80%	80%	80%	80%
Ft.-Candles—Center of Screen ³					
Screen Width 15 ft.	15.8	17.0	22.6	26.8	—
" " 20 ft.	8.8	9.6	12.6	15.2	19.2
" " 25 ft.	—	—	—	9.7	12.2
" " 30 ft.	—	—	—	—	—

5.5" E.F. f/2.5 Uncoated Projection Lens—Maximum Light⁴

Total Screen Lumens ¹	5000	5500	7200	8200	10600
Screen Light Distribution ²					
Side to Center	65%	60%	60%	65%	65%
Ft.-Candles—Center of Screen ³					
Screen Width 15 ft.	19.6	21.3	28.6	—	—
" " 20 ft.	11.0	12.0	16.0	17.8	23.5
" " 25 ft.	—	—	10.2	11.3	15.3
" " 30 ft.	—	—	—	—	7.9

5" E.F. f/2.0 Coated Projection Lens

Total Screen Lumens ¹	5900	6600	8600	10300	13000
Screen Light Distribution ²					
Side to Center	80%	80%	80%	80%	80%
Ft.-Candles—Center of Screen ³					
Screen Width 15 ft.	20.3	22.7	29.8	—	—
" " 20 ft.	11.4	12.8	16.8	20.2	25.0
" " 25 ft.	—	—	10.6	12.9	16.0
" " 30 ft.	—	—	—	—	11.0

5" E.F. f/2.0 Coated Projection Lens—Maximum Light⁴

Total Screen Lumens ¹	6500	7500	10000	11000	14000
Screen Light Distribution ²					
Side to Center	65%	60%	60%	65%	65%
Ft.-Candles—Center of Screen ³					
Screen Width 15 ft.	25.5	29.0	—	—	—
" " 20 ft.	14.4	16.2	22.1	24.2	—
" " 25 ft.	—	10.4	14.1	15.4	19.0
" " 30 ft.	—	—	—	10.8	13.3

REFERENCES:

¹ Screen lumen figure is for systems with no shutter, film or filters of any kind.

² Per cent screen light distribution refers to ratio of light intensity at side of screen to that at the center.

³ Ft.-Candle values at center of screen assume 50% shutter transmission, no film or filters of any kind.

⁴ Maximum light is value with system adjusted to produce maximum light.

An Important Announcement

to Projectionists—Supply Dealers—Manufacturers by

JEWELL—SUMMER COMPANY

NATION-WIDE DISTRIBUTORS OF MANUFACTURED PRODUCTS

We will distribute, through recognized dealers, the finest theatrical equipment of every description. As the first step in this program, and in recognition of projectionists' importance in motion picture equipment matters, we have contracted for the exclusive distribution of the products of

HUFF'S MANUFACTURING COMPANY

of Los Angeles, maker of nationally-known projection accessories, including the following projectionist-designed items which have been proven best by test in hundreds of theatres:

WATER-ELECTRIC POSITIVE CARBON COOLER

Effects a deeper carbon crater of increased diameter without penciling, thus filling completely with light *both* the mirror and the aperture and increasing screen light by 40% with a practically flat field! A *must* for high-amperage studio lamps, this unit enables a reduction in carbon costs (often through substitution of a smaller trim and always through a slower burning rate), slashes current costs through lower amperage, and gives a beautiful screen image. Carbon is heated only $\frac{3}{4}$ inch. Available for *all* Suprex-type carbon trims up to 9-mm, and also for the Peerless 13.6-mm Hy-Candescent lamps.

POSITIVE CARBON CUSHION

Prevents all carbon breaks and cracks by absorbing all pressures, insuring perfect electrical contact on even the shortest

grip. Simply installed: merely replace present clamp within seconds.

NEGATIVE CARBON ALIGNER

Permits adjustment to within one-thousandth inch—which remains set. Hairline vertical and lateral adjustment eliminates off-center burning which occasions screen light loss of up to 33-1/3%.

OBSERVATION AND PORTHOLE GLASS

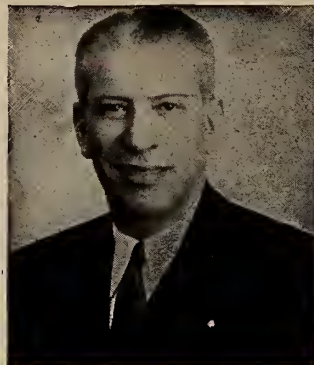
You don't use window glass for your eyeglasses—for your camera—for your projection lens—and you shouldn't use it for your projection ports. Huff's porthole glass is of the finest optical quality and insures correct focus constantly.

ANTI-AMPERAGE AIR CHUTE

Made for the Simplex E-7, this chute effectively picks up and sends a current of *cool* air to all elements, including the film, adversely affected by heat.

Jewell-Summer Co. will steadily augment its list of top-flight equipment of proven merit for *all* theatrical purposes and will distribute these products through recognized theatrical supply dealers. Our extensive merchandising experience with quality equipment in many fields ("Nation-wide in Scope-Local in Service") and our wide resources are yours to command. Foreign trade is served by our own export department. Inquiries relative to any phase of theatrical equipment distribution are solicited. Please address our headquarters at 407 Commercial Center St., Beverly Hills, Calif.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

ONE of the most heart-warming experiences in recent years to those interested in matters of social significance was the magnificent way in which Labor closed its ranks and, ignoring self-appointed oracles who presumed to tell them how to exercise their voting franchise, administered a terrific lacing to those reactionaries who all along have been shouting about the "mandate" they received to effect "reforms" as a result of the 1946 congressional elections.

The fact that these "reforms" consisted of the vicious Taft-Hartley bill, the lifting of price controls which sent prices for food and other essentials sky-high, and the brazen "protection" given the notorious real estate lobby—all these manifestations of "concern" for the working man were more than ample to make Labor cry "enough". We trust that recognition of a "mandate" as a result of the recent election will be as prompt and expressive of the will of the people as were the 1946 results, which could have been achieved only by an apathetic Labor group.

Now that its real strength has been demonstrated, we trust that never again will Labor be caught napping and once more fall a victim to unscrupulous reactionaries.

- Under the terms of a new two-year contract recently concluded between the IA and the Altec and RCA service com-

panies, sound service engineers received a weekly pay increase of \$10.40, plus increased automobile allowance, retroactive to August 22, 1948. The new contracts contain union-shop clauses and recognize the IA as exclusive bargaining agent for all sound engineers in the motion picture theatre field, including motion picture and theatre television work.

Representing the IA at the negotiations were Wm. P. Raoul, general secretary-treasurer; Thomas J. Shea, assistant president, and Joseph D. Basson, International representative. George L. Carrington negotiated for Altec and Ed Cahill for RCA.

- Sam Rubin, the progressive business agent for Local 488, Harrisburgh, Penna., was named a member of the Rent Advisory Board for Dauphin County, Penna.

- A "cost-of-living" increase of 5% over their present scale was recently awarded to the members of Local 236, Birmingham, Ala., according to a report received from Ralph Root, business agent. Department of Labor statistics show that living costs in Birmingham have increased almost 9% over last year, and the pay hike to the members of the Local is in accordance with the provisions in existing contracts.

- Roy W. Wier, member of Local 13, Minneapolis, Minn., was elected to Congress this month on the Farmer-

Labor ticket. He was backed by Labor's League for Political Education, of which IA President Walsh is a committee member, and defeated the incumbent, a Republican who voted to override President Truman's veto of the Taft-Hartley Law.

Wier became a member of Local 13 in 1914, and has been secretary of the Minneapolis Central Labor Union for the past 25 years. He was formerly a member of the Minnesota State Legislature and is at present a member of the Minneapolis Board of Education.

- We regret to report the loss of another old-timer in the death of Lynton W. Burke, member of Local 126, Fort Worth, Texas, and stage manager for many years at the Worth Theatre. Lou, as he was familiarly known, was one of our early IA vice-presidents, having been elected to office at the 1912 convention which was held in Peoria, Ill.

- Detroit Local 199 reports it has successfully concluded new two-year contracts with the independents, with the following provisions: a flat \$5 weekly increase for all men working in theatres with a seating capacity of 750 and over; \$3 weekly increase for the first year for men working in theatres having a seating capacity of less than 750, with an additional \$2 increase the second year. This brings the lowest wage scale in Detroit to \$78 per week, per man.

- Over 30 years ago Virgil O. Gittus transferred his membership in Atlanta Local 225 to New York Local 306, and has remained here ever since. At a recent 25-30 Club meeting, of which he is a member, Virgil demonstrated his latest invention, a photographic meter which he claims will revolutionize the industry when he is ready to release it to the trade.

- John Kunstmann, business agent of Local 655, Sheboygan, Wis., was re-elected for the 10th consecutive term as president of the Wisconsin Association of Stage Employees and Projectionists at the recent annual convention of the Association. Among the guests present



IA President Walsh receives a gold Life Membership Card in New York Local 306 from Herman Gelber, president of the Local, at the recent 35th Anniversary party. Beaming approval from the background are Eddie Stewart, member of Local 306 executive board; Harry Storin, vice-president of the Local, and Tom Murtha, business agent of Brooklyn Local 4.

were IA President Walsh; Felix D. Snow, 6th IA vice-president; John Wald, business agent of Local 434, Peoria, Ill. and newly elected secretary for the 9th District. Representing Chicago Local 110 were James Gorman, president; Gene Atkinson, business manager; Clarence Jalas, secretary, and John Burns.

• **Correction:** It was Mike Sawdo and not Jim Sauter, as we stated in our September issue, who was one of the two Cleveland Local 160 men in charge of the women's headquarters at the Hollenden Hotel during the IA convention. We hope Mike will forgive this slipup.

• Billy Wise, long-time business agent of Local 297, San Diego, Calif., has embarked upon a new business venture—that of theatre supply dealer—in addition to his official duties in the Local, and as a sideline to his regular job of running a projection machine. Wise is very popular with his fellow workers, and we believe he will enjoy a successful career.

• A bill presented before the New York City Council providing for proper projection room ventilation was opposed and defeated by the Metropolitan Motion Picture Theatres Association and the Independent Theatre Owners Association.

• Over 1500 guests were present at the 35th Anniversary party which New York Local 306 held last month in the Grand Ballroom of the Hotel Astor. It was a gala event and was attended by IA officials and representatives of leading theatre interests. One of the highlights of the evening was the presentation by Local 306 President Herman Gelber of a solid gold Life Membership card to IA President Walsh, the first of its kind ever awarded by the Local. Gelber, in turn, was presented with a life-size portrait painting of himself, a gift from a group of intimate friends. Lester Isaac, director of projection for Loew's, Inc., made the presentation.

Harry Storin and Eddie Stewart, general chairman and general co-chairman, respectively, of the Anniversary Committee, received able assistance from the members of the Arrangement Committee in making this one of the most successful affairs in the history of the Local. Serving on the Arrangements Committee were Mike Springer, chairman; Eli Asen and Wm. DeSena, co-chairmen; Arthur Silverman, Barney Weiner, Max Feinberg, Bert Popkin, Maurice Rudley, and Cecil R. Woods, Sr.

• Max L. Adamson, business agent of Local 371, Edmonton, Canada, and Mrs. Adamson spent some time in the States visiting with friends and relatives be-

fore returning home from the Cleveland convention. Mrs. Adamson is a native of Waukegan, Ill., and she and Max had quite a time renewing old acquaintances.

• Very much in evidence at the recent 35th Anniversary party of Local 306 and giving off with all his old-time charm and affability was that pillar of the projection field, P. A. McGuire. Technically, Mac was numbered among his International Projector Corp. cohorts, but actually it is impossible to localize Mac at any industry affair because he belongs to the entire projection field and the craft never lets him forget it.

• Ernest L. Smith, business agent of Local 674, Biloxi-Gulfport, Miss., spent several weeks in Birmingham, Ala., attending the Reserve and National Guard School. Smith is a lieutenant in the National Guard.

• Local 466, Fort Wayne, Ind., presented its retiring secretary, Ellis A. Karns, with a silver Honorary Membership card. Ellis has held office in the Local for the past 15 years, and upon his retirement from the Local left for St. Petersburg, Fla., where he plans to make his permanent home.

• Congratulations to Jake Mitchell, sales manager for LaVezzi Machine Works, on his 75th birthday. Jake's friends in the industry will be glad to know that he not only looks well but is enjoying excellent health.

• Joe Cifre, member of Boston Local 182 and chief barker for Variety Club's Tent No. 23 (New England), was recently cited by Variety's International chief barker, Bob O'Donnell, for his splendid efforts in helping his Tent raise funds for the Children's Cancer Research Foundation. The Foundation was presented with a check for \$123,850.17, the amount collected by Tent 23 from the citizens of New England. A plaque was



Pete Mole, pioneer in the development of lighting equipment, receiving the SMPE Progress Award from President Loren Ryder.

presented to Tent 23 for performing the most outstanding work of any Variety Club tent during 1947. The award, which was accepted by Cifre on behalf of his Tent, was made at a citation dinner held at the Hotel Statler in Boston.

• We had the privilege of addressing the members of St. Louis Local 143 at a recent meeting. It was good to see so many of our old friends again—Bill and Leo Canavan, Harry Barco, Harvard O'Loughlin, Al Berns, Ed Bostelman, Oscar Kleintopf, George McDonald, Joe Schuller, Ruby S'Renco, Bob Tomsen, Harold Fitzgerald, Walter Schaefer, and all the rest of the boys. The Local ran off the special movie, "The History of the IATSE," which had its initial showing at the Cleveland convention. The picture was warmly received by the men, and the appearance of Bill Canavan on the screen was the signal for a prolonged round of applause. We think this movie will prove to be a popular feature at IA gatherings.

• Harry Oppenheimer, old-line guard of Local 244, Newark, N. J., was re-elected to his 16th consecutive term as vice-president of the 2nd District of the New Jersey State Federation of Labor.

• Tony Roman, member of Albany Local 324, died recently in his 62nd year. He was regarded as an authority on projection matters, having worked as a projectionist in various theatres in Albany for more than 40 years.

• George Raaflaub, secretary of Syracuse Local 376, is very active in Masonic circles and is aiming for the office of Monarch of Keder Khan Grotto. Another member of the Syracuse Local, Lionel Wilcox, seems to have half an eye on the same post—the jockeying for position will be very interesting to watch.

• Our good friend, Harry Storin, vice-president of New York Local 306, is the latest addition to the ranks of grandpappies. His first grandchild, a lusty boy, was ushered into this world several weeks ago.

• Roy Brewer, International representative on the West Coast, was re-elected president of the Hollywood Film Council of the AFL.

• A standing invitation to a steak dinner on his houseboat in Fort Erie, Canada, has been extended to members of the 25-30 Club by Walter Matchette, member of Buffalo Local 233 and the 25-30 Club.

• The IATSE Golfers Club, Milwaukee Local 164, held its annual banquet October 26 last at the Milwaukee South

Shore Yacht Club. Dinner and dancing topped off an evening of merrymaking for the club members and guests. Roy Bernier was master of ceremonies, and presented the Abbott and Costello trophy to Ray Schneider, who took top honors as the Club's best golfer. A dozen golf balls were presented to each member, in addition to prizes of golfing paraphernalia, such as clubs, gloves, etc.

Among the speakers were Glenn C. Kalkhoff, president of Local 164; Robert Lucht and George Brader, executive board members, and Floyd Woodsmall

and Robert Wittman, president and treasurer, respectively, of the Golfers Club. A special tribute was paid to the "golf widows" of the Local.

- *Out-of-town visitors:* N. Tanner, member of Toronto Local 173, who came to the States to visit his mother in Paterson, N. J.; and George Raaflaub, Syracuse Local 376, who stopped off in New York with Mrs. Raaflaub on their way home from a sightseeing trip to Washington, D. C.

- One of the most active workers in the

Labor League for Political Education is H. Paul Shay, secretary of District No. 10, New York. He constantly hammered away at the Local Unions urging them to get their men out to vote in the recent elections and help defeat those legislators who supported the Taft-Hartley Act.

25 Years Ago—November 1923

- After a stormy session with the executive board at a special meeting held in Portland, Ore., Charlie Shay resigned as president of the IA and William F. Canavan, 1st vice-president, was elected to succeed him. H. Guy Culver of Oklahoma City Local 112 was elected 5th vice-president, filling the vacancy created by Canavan's elevation to the presidency. . . . William McKinnon resigned as manager of the Adjustment and Claim Department, and was succeeded by William D. Lang, New York Local 1. . . . Labor won a sweeping victory in the state of Washington when Judge Walter M. French denied an injunction restraining picketing of the John Danz theatres. Judge French ruled that "picketing is no longer *ipso facto* unlawful in the state of Washington. Workers have the right to do collectively anything that they have the right to do individually." . . . New York Local 1, opposing the Shay resignation, requested President Canavan to call a special IA convention. The General Office sent a letter to all Locals in a referendum vote on the proposition of calling a special convention. On the face of returns received, it was decided that the next (27) convention be held on the regular date. . . . Joe Magnolia, member of New York Local 1, resigned as International representative. . . . Charges were preferred against Charlie Shay by the IA executive board. . . . Joseph N. Weber, president of the AFM, was stricken with an attack of ptomaine poisoning. . . . Local 366, Westchester County, N. Y., which had been taken over by the General Office, regained local autonomy.

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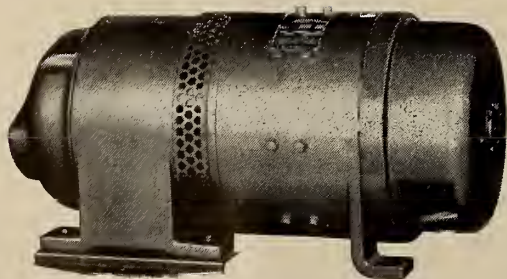
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FIRST CHOICE OF MODERN THEATRES EVERYWHERE

For steady screen illumination
leading theatre owners depend on a

TransVerteR

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THE HERTNER ELECTRIC COMPANY

12690 ELMWOOD AVE. • CLEVELAND 11, OHIO

A General Precision Equipment Corporation Subsidiary

MOTORS • MOTOR-GENERATORS • GENERATOR SETS

Direct vs Intermediate Tv

The relative advantages of the direct and the intermediate theatre TV systems were discussed by Ralph V. Little, Jr., RCA engineer, at the recent National Electronics Conference in Chicago. On the occasion of the first showing of a theatre Tv system in that city, Little said: "Direct projection has the appeal of immediate reproduction of video, simplicity of operation of equipment, and relatively low operating expense."

Film System More Advantageous

"The intermediate film system has the advantages that standard film projection equipment may be used with present screen brightness, programming can be scheduled to best advantage, editing of

film is practicable, and a permanent film record, which might be used for successive shows and syndication to small theatres, is provided.

In commenting on the performance of the two systems, Little said: "The capabilities of the projection system are equal to the best audio Tv equipment, but, of course, any deterioration of the signal between the camera and the projector causes an inferior picture on the screen. Experience has shown that large-screen images produced by both the direct and intermediate systems are entirely acceptable to critical audiences."

New Ampro 'Compact' 16-mm Sound-Film Projector

A noteworthy innovation in 16-mm sound-film projectors is the new lightweight single-case Ampro Compact. Compact, indeed, for the case is only 15" high, 21½" long and 9¾" wide, including projector, sound unit and speaker, and can be carried with one hand like a piece of luggage.

It is extremely easy and quick to set up, having no reel arms, belts or screws to attach or fasten. One merely lifts the mechanism, pulls the reel arms into position and places the speaker, mounted in the lift-off cover, beside the projector.

Extreme light weight has been attained without the sacrifice of Ampro quality; in fact, certain improvements were effected in



The Ampro 'Compact' 16-mm sound-film projector ready for operation. Note speaker in cover case.

this mechanism. Ampro has long been noted for its quiet operation, but this new Compact is the quietest machine in the line, due partly to an intermittent, non-skip type shutter movement.

Low-cost service maintenance is a feature of the Compact: removable front and rear covers, reflector and condenser lenses mounted on the front cover for quick cleaning, and a removable governor facilitating adjustment are just a few features making for extreme accessibility.

The projector mechanism and soundhead

design incorporate basic features of Ampro's time-tested Premier-20 model, including: two speeds for both silent and sound film, fast automatic rewind, use of standard lamps including 1000 watts, easy threading over large sprockets, triple claw movement, new swing-out gate, 2000-foot reel arms, free flow, streamlined cooling system, and rotating type sound drum.

Complete details and descriptive literature available from Ampro Corp., 2835 N. Western Ave., Chicago 18.

Mighty Mite: Xmas Seals

Each year at this time IP is glad to devote space to an appeal in behalf of that mighty mite which has done so much good for so many, not the least of whom are showfolk, at so little cost—the Christmas Seal.

CAREFUL estimates place the number of active tuberculosis cases in this country at 500,000. About half of them are known to health authorities. Approximately 250,000 people are going about their daily tasks perhaps ignorant of the fact they have the disease. Not only are their own lives in danger, but they may be spreading the disease to those with whom they come in contact.

Tuberculosis cannot be brought under control and eliminated from American life until these 250,000 unknown cases are brought to light and treated.

A well-planned, soundly organized, nation-



For Screen Images . . .
As The Camera Took Them

Super Cinephor

THE more you close the gap between the critically precise camera image and the projected image on your screen, the better your presentations, and box office receipts, will be. That is exactly what the Bausch & Lomb Super Cinephor projection lens is designed and built to do. You can retain all the original beauty of fine detail, subtle tone, and brilliant color of your films by replacing your old lenses with Bausch & Lomb Super Cinephor lenses. Bausch & Lomb Optical Co., 616-X St. Paul St., Rochester 2, N. Y.



BAUSCH & LOMB

OPTICAL COMPANY



ROCHESTER 2, N. Y.



wide campaign against Tb is being carried on throughout the year. The National Tuberculosis Association inaugurated it in 1904. Today, the Association and its 3,000 affiliated state and local associations, in cooperation with the U. S. Public Health Service, state and local health departments, the medical and nursing professions, are working ceaselessly to induce every person 15 years of age and over to have a chest X-ray taken regularly.

In thousands of communities the tuberculosis associations, in cooperation with local health authorities, provide mass X-ray services. Large groups are X-rayed quickly and at low cost. Often, the services are free.

Educating the public is of prime impor-

tance. If people are made aware of Tb, its cause and prevention, they will more readily take action to protect themselves. Education on Tb is carried on in many forms—through booklets, magazines, newspapers, radio, posters, displays, movies, talks.

The year-round tuberculosis control work of the 3,000 associations affiliated with the National Tuberculosis Association is supported by funds raised from the annual sale of Christmas Seals. Of the money raised each year, 95 per cent is used *within the state of origin*; 5% is allocated to the National Association.

Christmas Seal funds support education, case-finding, rehabilitation and medical research. The specific program in each com-

munity depends on the needs and resources of that community. Christmas Seal funds are not used for treatment or for building and maintaining sanatoriums. These are provided from tax funds.

Since 1904, when the National Association was founded, Tb has been forced down from the leading cause of death in this country to seventh place. If Tb had continued to kill at the 1904 rate, in the years since then 4,000,000 more people would have died of Tb than actually did.

Buy Xmas Seals

SMPE MEET PAPERS ABSTRACTS

(Continued from page 24)

Underwriters' Laboratories, are compared with new types of vaults for the storage of films of primary value. They are discussed in terms of vent area per film load, horizontal versus vertical arrangements of film containers, insulation between tiers of cans and individual cans, with special mention of a new retractor insulation belt.

Three charts are submitted, outlining the construction of film vaults for primary, secondary, and tertiary safety storage of films of varying degrees of value.

DIRECT POSITIVE VARIABLE DENSITY RECORDING WITH THE LIGHT VALVE

C. R. Keith and Vincent Pagliarulo
Western Electric Company

Combining the advantages of variable density and direct positive recording, these records improve over previous methods in the points of high output level, high signal-to-noise ratio, low distortion, and elimination of printer loss and distortion. An a-c bias frequency of 24 kilocycles is superimposed on the light valve ribbons along with the signal currents, the amplitude of the bias being 200%. Present indications are for extensive use of the new method in the 16-mm and television fields. A demonstration followed the paper.

TEST SOUND-FILM CALIBRATIONS: PROPOSED STANDARDS

F. J. Pfeiff and E. S. Seeley
Altec Service Corporation

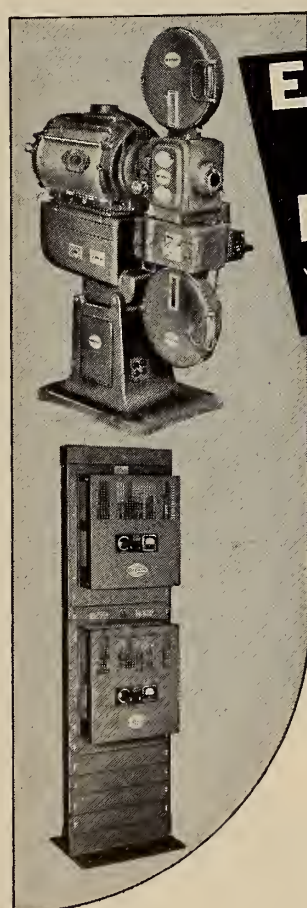
Despite a decade and a half of widespread use of multi-frequency test reels throughout the motion picture industry, the method of calibration has not been standardized. One result has been non-uniformity of calibration by various agencies and another is lack of clear understanding of the significance of the calibration data.

This paper discusses prevailing diversity of calibration results, describes a means of securing an absolute calibration of relative level at various frequencies, and proposes a standard definition of level of recorded signal and methods for measuring it.

POSSIBILITIES OF A VISIBLE MUSIC

Ralph K. Potter
Bell Telephone Laboratories

Some relationship should exist between audible music and any visible counterpart. Loudness might be represented by a movement toward or away from the observer, and



ESSENTIAL TO GOOD BOX OFFICE FINEST PROJECTION AND LIFELIKE SOUND

They cost less over the years when you install



PROJECTORS AND SOUND SYSTEMS

Designed and built by specialists to assure long, trouble-free service.

The Completely New

MOTIOGRAPH PROJECTOR

Rock steady projection . . . clearest picture definition . . . smooth, cool operation. Easy accessibility of all units. Simplicity of design, precision engineered and skillfully constructed of finest materials.

TWO BASIC SOUND SYSTEMS

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frequency by a movement to the left or right as pitch rises or falls. Visible music must make the viewer feel that the display actually represents what he hears, rather than being mere "dancing abstractions."

Adherence to Established Pattern Vital

Once a pattern is established, it must be adhered to, in order not to confuse the audience. A sample illustration shows the music as a succession of equally spaced peaks covering a screen. Each of these makes up the overtones of a musical note, and the whole forms a complex design related to the appearance of flames. Color is suggested to enhance the effects described.

PRECISION SPEED CONTROL

A. L. Holcomb

Western Electric Company

Herein is described a precision speed control capable of maintaining motor speed within 1 part in 25,000 under voltage variations of $\pm 20\%$ and load variations from zero to full load. For motion picture production this order of regulation provides the equivalent of synchronous operation without physical connection between such motors.

A further development of this circuit is described which provides a compact speed control unit for existing distributors or other electrically-interlocked systems.

RECORDING EQUIPMENT AROUND

THE WORLD

R. E. Warn

Westrex Corporation

Studio conditions in foreign countries often differ widely from those familiar to the U. S. A. Some can afford only one recording channel, and all studio activities must be arranged around the channel. One studio in Siam produces for a total of less than 100 theatres, while the star of a Malay film produced just before the war re-



HARVEY LEVENSON—Owner, Cozy Theatre, Los Angeles, California—says:

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ceived the equivalent of \$5 in American money per day. Recording equipment used overseas is described.

THEATRE TYPE SOUND REPRODUCER FOR DOUBLE-WIDTH, PUSH-PULL OPERATION

G. R. Crane

Western Electric Company

The general construction of a new push-pull studio reproducer is described, with special attention paid to the unusual optics involved.

INFLUENCE OF CARBON COOLING ON H-I CARBON ARC AND MECHANISM

Wolfgang Finkelburg

Engineer Research Development Laboratories

Water cooling of carbon arcs makes possible a steady arc of high brilliancy with a shallower crater and greatly lowered carbon consumption. All properties of arcs were changed when cooling was applied. Carbons are cooled by copper jackets containing circulating water, the carbons being enclosed near their burning ends. Similar effects were noted with compressed air cooling. Observations are made of the effects of cooling on various arc properties and the results of investigatory tests are given.

[NOTE: Additional SMPE papers abstracts will be published as they become available.]

20 YEARS OF SERVICING

(Continued from page 15)

tively expensive equipment. Thousands of theatres, however, had equipment of sturdy design which was still performing reliably and would evidently continue to perform reliably for some years, and numerous exhibitors could not afford replacing their equipment at that time. Altec considered it a duty to improve the quality of performance of such equipments in so far as possible within the limited financial means available to those exhibitors.

The equipment installed in a large percentage of such theatres were the early W. E. systems which had large horns equipped with 555-W receivers. It was found that this loudspeaker equipment was deficient in reproducing the lowest and the highest frequencies, but that suitable equalization introduced in the amplifier circuits could in large measure compensate therefor. It remained to determine what equalization curve or curves would be required to do the best possible job.

Portable Measuring Unit

To facilitate such determination, a special equalizer of extreme versatility was developed which could be controlled from a listening position in an auditorium.

This apparatus consisted of a portable amplifier, set up in the projection room, and an equalizer unit placed at any selected listening position in the auditorium

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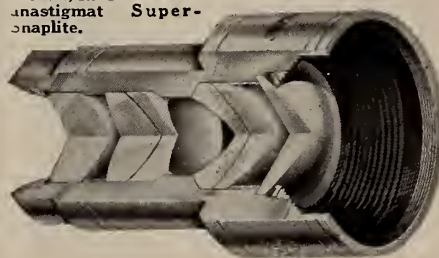
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with long cables interconnecting the two units. The equalizer system was arranged for insertion into any existing type of sound system and consisted of a number of mutually independent sections each controlling a portion of the spectrum and each adjustable in calibrated steps over a considerable range of response changes.

In practice, an engineer seated himself before the equalizer unit and, while

a suitable diversity of program material was reproduced, manipulated the various equalizer sections until the resulting quality was considered the best obtainable. The resulting response curve was then measured. Theatres were selected for the tests to provide a full variety of acoustical conditions and auditorium shape.

The curves revealed that a relatively small degree of variation from a more or

less universal curve would accommodate nearly all theatres, but that a few required more significant departures from the average. The universal curve, included a large rise at the lower end of the spectrum to reinforce the base response and a larger rise to about 5000 cycles to provide good presence and a suitable reproduction of sibilance.

AQ-1030 Equalizer Developed

Without separate l-f speakers, the lowest base frequencies could not be reproduced by this horn equipment regardless of the amount of equalization employed, but the cutoff of the horns was low enough for the equalization to provide a big improvement in the overall base region. An inexpensive equalizer known as the AQ-1030 was designed for insertion in most types of theatre amplifiers.

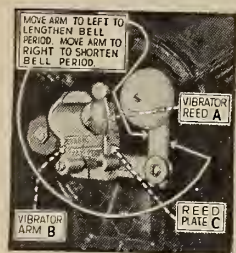
Improvement in the h-f response made more apparent than ever the flutter produced by the sound reproducer. Development of new sprockets (the new 0.943-inch standard) provided a much better accommodation to the current normal film shrinkage, and reduction of cam action in the film drive sprocket made it possible to reduce the flutter in these older sound systems to values which were not evident to most casual listeners and not distressing to the discriminating.

Acoustic-Response Measurements

A further shortcoming of the earlier sound systems lay in the somewhat deficient power capacity of the final amplifier. This deficiency was aggravated by the equalization. A new tube was developed which increased the power capacity of a very large number of amplifiers from about 1½ to about 8 watts. The new tube had characteristics somewhat similar to one of the later W. E. tubes but, being designed for this particular application, it had a special type of base and a special filament voltage. One feature of the design was the much longer life and greater reliability than that obtainable from commercial receiving tubes.

A broad study was inaugurated by the Academy to determine the variation in

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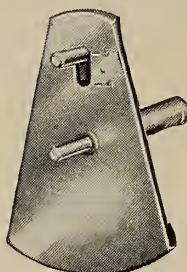
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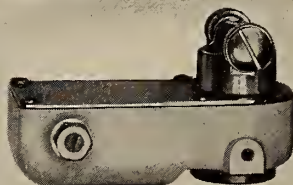
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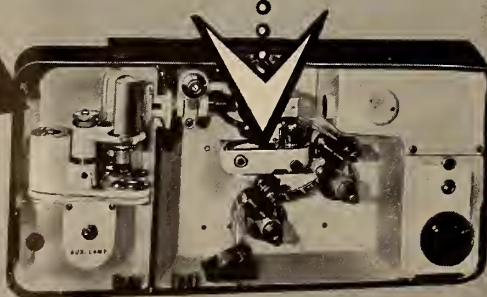
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Century Sound Reproducer

Altec's New Divisional Setup

Consolidation of its New York, Philadelphia and Boston districts into a newly-created Eastern division, with headquarters at 250 West 57th St., has been effected by Altec Service Corp. Promoted to division manager is C. S. Perkins, while A. J. Rademacher has been named business manager.

Field managers will be R. D. Fairbanks, R. E. Pierce, L. J. Patton and F. J. Pfeiff, with sales representation being afforded by Bert Sanford, L. J. Hacking, D. A. Peterson and M. N. Wolf. Similar divisional setups are now being worked out for the rest of the country, the general objective being to equalize territorial coverage by field forces and to simplify the managerial framework.

acoustic-response characteristics in a large number of theatres. Non-directional microphones, tripods, cables and related gear were supplied the field organization to operate in conjunction with the emergency amplifiers and output meters carried by all servicemen.

The single source for measurements of this type was a warble film. Some misgivings were felt in connection with the makeup of warble film currently in use, and theoretical study was made of this subject. The standard Academy warble film followed the principles set forth in this study.

It was felt that a proper interpretation of acoustic response measurement required knowledge of the reverberation time characteristic of a given auditorium. Existing reverberation measurement equipment was very cumbersome, expensive, slow and time-consuming, and required very expert analysis for evaluation. Altec, therefore, developed a com-

compact, inexpensive, easily operated and easily interpreted instrument for this measurement.

For the instrument to be practicable for use by field forces in theatres on any significant scale, it required the foregoing characteristics, and it had to be capable of yielding the desired data with a minimum expenditure of time during off-show hours. The resulting instrument had these qualities, and the degree to which it minimized the time consumed is best revealed by an actual demonstration.

[To be Continued]

15 Million Pictures a Second!

The action of striking a match may be photographed at speeds so high that nearly 11 days would be needed to show it on the screen at normal silent motion picture speed. This was just one of the amazing disclosures made during the high-speed photography session at the recent SMPE convention in Washington.

The camera capable of a week-and-a-half photography in a second operates at a speed of 15 million pictures a second! Actual motion pictures of fast-moving objects were shown—photographed at speeds in excess of 10 million exposures a second, as contrasted with the usual speed of 16 exposures per second for silent motion pictures.

Even the X-ray has come into the high-speed picture-taking scene. Westinghouse engineers reported on high-speed X-ray motion picture equipments, intended primarily for the study of burning rocket propellants but having many other applications.



O. C. LAM—President, Lam Amusement Company, Rome, Georgia, operators of 15 theatres in central Georgia—says:

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TV: HOW IT WORKS

(Continued from page 18)

above the l-f end of the channel), whereas the frequency of the audio carrier is 49.75 mc (0.25 mc below the h-f end of the channel).

Both these signals, together with their sidebands, are picked up by the antenna and fed through a transmission line to the input of the r-f amplifier. Essenti-

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ally, the function of the r-f amplifier is the same as that of the r-f amplifier in any superheterodyne receiver—to amplify the signal and to reject unwanted signals in adjacent and other channels. In this case, the r-f amplifier is broadly tuned so that both the video and sound carriers, which are separated by 4.5 mc, are amplified equally.

After being amplified in the r-f amplifier both signals are fed to the mixer circuit where the conversion of the signals to the intermediate frequencies (i-f) takes place. Since there are two radio frequencies it of course follows that two separate intermediate frequencies are produced.

Conventional Sound Channel

In accordance with present practice, the oscillator operates at a frequency approximately 26 mc above the video carrier frequency. For the channel being received, the frequency of the oscillator in the receiver is 71 mc. Since the oscillator frequency is 25.75 mc above the video carrier frequency in this case, 25.75 mc will be the value of the video i-f. In the same way, the i-f of the sound signal is equal to the difference between the oscillator frequency and the

sound carrier frequency: 71 minus 49.75 mc, or 21.25 mc.

Following the mixer, the sound channel in the block diagram is entirely independent of the rest of the receiver and in practically every detail is similar to a conventional receiver used for broadcast reception. Thus the 21.25-mc sound i-f signal passes through the sound i-f amplifier (the selectivity of which is broader than usual to minimize the effects of oscillator drift), and is demodulated at the sound detector.

The avc voltage is supplied in the usual manner to control the gain of the stages in the sound i-f amplifier. In accordance with FCC standards, frequency modulation (F-M) is used exclusively for all Tv sound.

Returning to the video signal, we have seen that a 25.75-mc i-f signal is produced by the mixer and that this signal carries the video modulation. As the diagram shows, this signal is amplified in the video i-f amplifier, which usually consists of several stages, and finally

reaches the video detector, where the signal is demodulated. The video signal recovered at this point is essentially the same as the output of the camera tube, thus it contains all the information required to reproduce the picture, and in addition, includes the blanking and sync pulses.

The video detector is followed by the video amplifier which, in terms of a sound receiver, corresponds to the audio amplifier. The function of the video amplifier is to amplify the video signal so that its amplitude will be great enough to "swing" the modulation grid of the picture tube. For the average picture tube this requires approximately 25 volts, peak-to-peak.

Note in the diagram that the polarity of the video signal is reversed 180 degrees for a single stage of video amplification and that the receiver is arranged so that the signal which reaches the control grid of the picture tube has a positive polarity. As a result, the synchronizing impulses appear in the blacker-than-black (highly negative grid bias) part of the picture-tube characteristic so that the beam is blocked during the retrace part of the line and field sweeps.

In addition to supplying the video signal and the signal which actuates the avc system, the detector supplies the video signal to the synchronizing separator. The purpose of this separator is to remove the picture component from the complete video signal and then to separate the horizontal sync pulses from the vertical sync pulses. As is shown, the horizontal sync pulses are arranged

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to control the timing of the horizontal deflection circuit, while the vertical sync pulses are arranged to control the timing of the vertical deflection circuit.

The power supply is not shown in the block diagram. A single low-voltage power supply can be used to take care of all voltage requirements throughout the receiver with the exception of the high-voltage requirements for the picture tube. The latter, which may include voltages as high as 30,000 volts, is supplied by a separate high-voltage power supply which has its own transformer, rectifier and filter. The two most popular high-voltage power supplies in use at the present time are the "kick-back" and the r-f power supply.

[THE END]

SOUND SYSTEM ELEMENTS

(Continued from page 6)

pose to find out whether or not a condenser is defective.

Because a condenser consists of two plates insulated from each other, a condenser, unless "leaks" or a short-circuit be present, does not pass steady d-c. It is therefore a good idea to test a condenser for leaks by connecting it in series with a dry battery and a flashlight bulb. The lamp will not light if the condenser be a good one.

Simple Voltmeter Test

A voltmeter may be used in place of the flashlight bulb for better results. A slight deflection of the needle may possibly occur every time the connection is made or broken, and should be regarded as certain proof that the capacitor is in tip-top shape. A constant deflection, on the other hand, indicates that the capacitor leaks current or is short-circuited, hence totally unfit for use.

Here is another test. Connect the capacitor to be tested to the terminals of a dry battery. Remove it and touch the capacitor leads to the cord tips of a pair of earphones. If a sharp click be heard in the earphones, you may be sure that the capacitor is in good condition.

If you suspect a condenser of large size to be open-circuited, connect it in series with a 10-watt, 110-volt bulb in a 60-cycle a-c circuit. Unless the condenser be open, the lamp will light more or less brightly. Condensers, while completely "open" to steady d-c, actually pass a-c. An explanation of this phenomenon is deferred; it suffices for the present merely to accept the fact that a capacitor in good condition does not pass steady d-c but does pass both pulsating d-c and a-c.

Chokes and Transformers


Inductance coils (chokes) and transformers next command our attention. Their weight betrays the large amount

of metal in them. In fact, both chokes and transformers are nothing but coils of copper wire wound on laminated cores of special soft iron. The air-core transformers of radio sets are not present in theatre amplifiers.


Choke coils (also called inductors) are usually rated in *henries* (h) and *millihenries* (mh). A millihenry is one thousandth henry. Transformers for sound current are rated in ohms no-load *impedance* to a selected a-c frequency.

Now, the chokes and transformers in a complete amplifier fall into two categories: those intended for power work (hence are found in the power-supplying part of the amplifier), and those the function of which is to handle sound currents (and accordingly are located in the amplifier proper). We are therefore careful to distinguish power transformers and filter chokes from "audio" transformers and sound chokes.

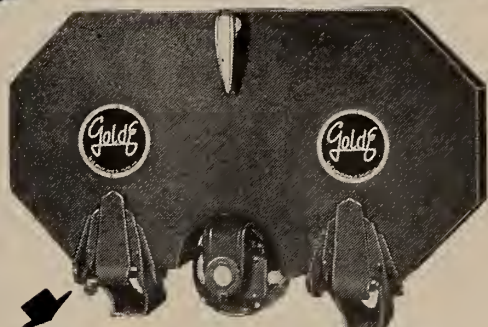
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transformers in much the same way as we test resistors, but we must never pass large currents through sound chokes and audio transformers, for to do so might magnetically "saturate" the iron cores of these devices and change the frequency-response characteristics of the amplifier.

Modern Amplifier Design

Sound chokes are seldom found in amplifiers of the most modern construction, the trend being to eliminate coupling transformers as far as possible. To minimize distortion, and thus insure high-fidelity sound reproduction, *resistance coupling*, though less efficient, is utilized at the input and between the stages of amplification. Nevertheless, there is always an *output transformer* in the last, or "power," stage of an amplifier, and *matching transformers* are commonly used with certain loudspeaker units.

A transformer, unless of the "auto" type, consists of two electrically separate windings on a specially constructed iron core. The input winding is called the *primary*, the output winding the *secondary*. If the secondary coil have three times the number of turns of wire used in the primary coil, the a-c voltage developed in the secondary will be approximately three times the a-c voltage ap-

plied to the primary. A transformer is thus a voltage-transforming device for alternating current.

Transformer Lead Code

Each winding may have two or more lead wires. If there be three lead wires, as in most audio transformers, one of them is a *center tap* which permits us to establish contact at the midway point of the coil. Four leads indicate that the coil has been tapped at two places in addition to the ends. The colored insulation of the lead wires enables us to identify them. Following are the codes for both power and audio transformers:

RMA COLOR CODE FOR POWER TRANSFORMERS

Primary

BLACK—Primary leads. (If tapped: common lead, black. Tap, black and yellow striped. Finish, black and red striped.)

Secondary

RED—High-voltage plate winding. (Center tap, red and yellow striped.)

YELLOW—Rectifier filament winding. (Center tap, yellow and blue striped.)

GREEN—No. 1 filament winding. (Center tap, green and yellow striped.)

BROWN—No. 2 filament winding.

(Center tap, brown and yellow striped.)

GRAY—No. 3 filament winding. (Center tap, gray and yellow striped.)

RMA COLOR CODE FOR AUDIO TRANSFORMERS

Primary

BLUE—Plate (finish) lead of primary. RED—B+ lead.

BROWN—Plate (start) lead on center-tapped primaries. (Blue may be used for this lead if polarity is not important.)

Secondary

GREEN—Grid (finish) lead of secondary.

BLACK—Grid return.

YELLOW—Grid (start) lead on center-tapped secondaries. (Green may be used for this lead if polarity is not important.)

Transformer Tests

Transformers are rendered useless by burned out or broken windings, short-circuited windings, and (rarely) by loose core laminations. An audio transformer may be tested for breaks in the windings by connecting the finish lead of the primary to the terminal of a battery, and the start lead of the primary to one wire of a pair of earphones. Touching the remaining wire of the earphone cord to the remaining battery terminal should produce a sharp "click-clack" in the phones if the winding be not defective.

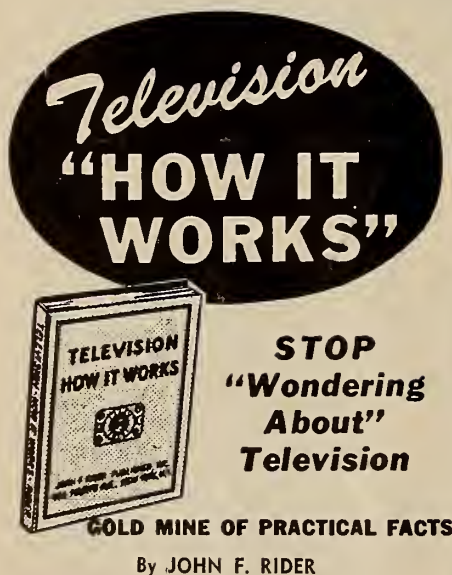
This test should be repeated with the secondary winding.

A power transformer may be tested by connecting the primary winding to a source of 60-cycle, 110-volt current. Make a test-lamp set by connecting five or six 10-watt, 110-volt light bulbs in series and attach a test prod to the two free terminals of the string of lamps. Touch the tips of the test prods to various pairs of secondary leads. When you hit upon the wires leading from the high-voltage plate winding, the string of series-connected bulbs will glow brightly. Without moving one of the prods, touching the other prod to the center tap will cause the bulbs to glow only half as brilliantly. The low-voltage filament taps may be tested by substituting a 15-volt Christmas tree bulb for the string of five or six 110-volt bulbs.

Care should be exercised to avoid shocks from the high-voltage leads when testing power transformers. Pressures of from 300 to 600 volts are developed in the plate secondary.

It goes without saying that these simple tests are not enough to enable a projectionist to track down trouble in complicated amplifier circuits, but they undeniably constitute a big step forward toward this goal.

[To be Continued]



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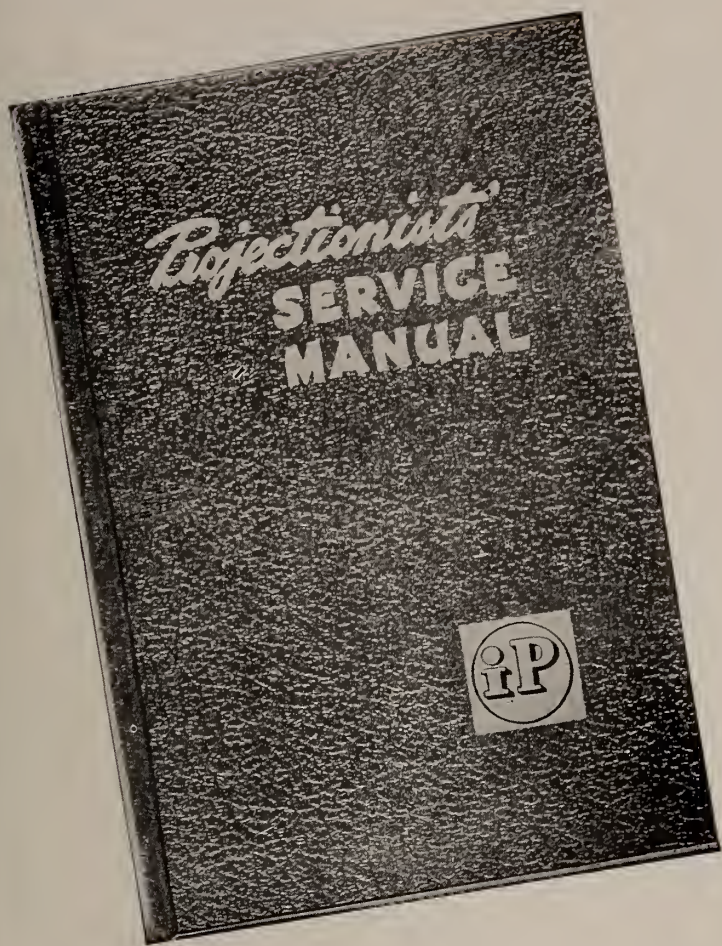
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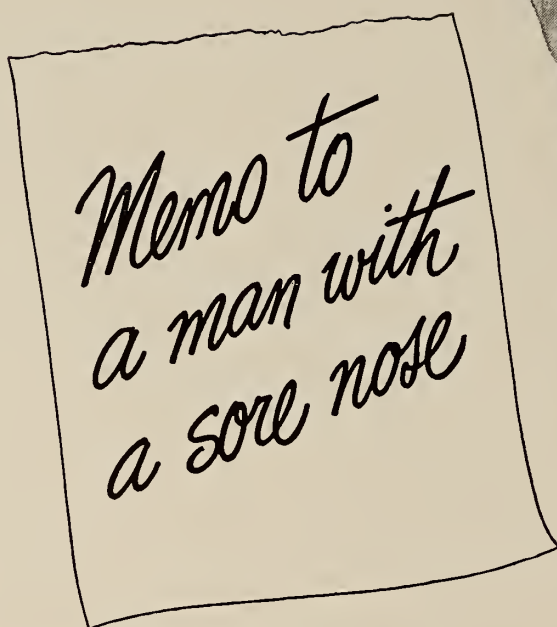
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HENRY B. SELLWOOD, *Editor*

Volume 23

DECEMBER 1948

Number 12

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MONTHLY CHAT

THAT American motion picture projection equipment no longer dominates the world market is now apparent to even the most casual observer of such matters. This state of affairs has been brought about by a combination of many factors—exchange restrictions and outright quota impositions played a major role in this development—but it would be unfair to assume that this situation reflects any lack of quality in such American products.

There have been many worthy European equipments—Philips, Ernemann, Walturdaw, and Kalee, to mention only a few—and now there is another formidable entry in the new British-made SUPA sound-film projector, which is described in this issue.

Understandably, a British technician would be expected to think highly of a home-grown product, and we have no doubt that the new SUPA is a worthy mechanism in every respect. Still, British efforts to gain world-wide acceptance for these projectors tend to induce doubt as to the "modernity" of American mechanisms, which are characterized as now being "outmoded" simply because they were not designed within the past couple years.

We've seen the new Kalee projector, and we've had the opportunity of examining detailed specs of the new SUPA job. In neither case were we convinced that these mechanisms outclassed the American projectors. True, the British have gone to great pains to introduce several knick-knacks which enhance the appearance of their jobs and might possibly be an aid to easier operation. But we've seen no fundamental advance or any degree of "modernity" that renders American equipments obsolete.

The British, desperately fighting the world trade battle, would dearly love to sell these projectors in the Americas—the Kalee has good Canadian representation now. Much as we sympathize with British trade needs, we think that American manufacturers are entitled to the utmost degree of protection should any such situation eventuate. The latter have fought the good fight down through the years, their products have stood up under the most gruelling tests of usage and climate—often without benefit of a serviceman within 1000 miles—and have yet to suffer through unfavorable comparison with any competing equipment.

We're not getting insufferably nationalistic about this, but we'd like to remind all concerned of their continuing debt to American projector manufacturers who kept theatres around the world going through the thick and the thin years by means of sheer quality of performance.

Most emphatically should this obligation be recognized and discharged on the American continent, whatever may happen in the world-wide trade area.



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Business Manager





Sound System Components

By ROBERT A. MITCHELL

II. Electricity and Electric Circuits

IN ORDER to appreciate the functions of the several units in an amplifier, it is necessary to acquire at least an elementary knowledge of electricity. Without such knowledge we can hardly hope to progress beyond the elementary tests described in the first article of this series.

Electricity is the name applied to certain phenomena associated with electrons. An *electron* is the basic unit of negative electric charge. Every atom consists of a positively-charged nucleus surrounded by clouds of electrons, the total number of electrons being such that the positive charge of the nucleus is completely neutralized.

If we add extra electrons to an atom, we get a negatively charged *ion*; and if we remove electrons from an atom, the resulting ion is positively charged. Ions such as these are produced in the tubes of "neon" signs and in tungar rectifier bulbs.

Current is Electrons in Motion

A stationary electric charge is termed *static electricity*. We may impart a negative charge to a hard-rubber rod by rubbing it with a piece of flannel. A positive charge may be obtained by rubbing a glass rod with a piece of silk. It was found very early in the history of electronics that positive and negative charges attract one another, and that *like* charges (two positives or two negatives) repel each other.

Because the negatively-charged rubber rod has an excess of electrons, and the positively-charged glass rod a deficiency of electrons, electrons will flow from the rubber rod to the glass rod if they be brought together, or if they be connected by a wire or other electron-conducting material. In fact, *an electric current is merely the effect of electrons in motion.*

How else may we produce electric charges? A very simple way is to connect a condenser to a dry battery or other source of d-c. The plate connected to the positive terminal receives a positive charge (deficiency of electrons) while

the plate connected to the negative terminal gets a negative charge (excess of electrons). The charge obtained in a capacitor which has been connected to a dry cell is sufficiently large to produce a decided "click" in a pair of earphones.

We need not discuss at length the curious manner in which electrons "flow" in a wire. They pass from atom to atom rather slowly—less than an inch a minute—but the *impulse* of their motion rushes along at a speed approaching the velocity of light and radio waves, namely, 186,000 miles per second. It is this rapid impulse that constitutes the "electric current" flowing in a wire.

Terrific Speed Within Vacuum

Despite the snail's pace of electrons jumping from atom to atom in a wire, the speed which they attain when passing between electrodes in a vacuum (in an amplifier tube, for instance) may be as great as 50,000 miles per second.

Because a negative charge consists of an excess of electrons, and because a negatively-charged body gives up its excess electrons to a body having fewer free electrons, electricity may be said to "flow" from negative to positive. A reasonable explanation of the action of photoelectric cells and amplifier tubes depends on this fact.

We can now see that all sources of electric current are nothing but electron "pumps." A battery pumps electrons by chemical action; a generator sweeps electrons along with magnets; and a phonograph pickup of the crystal type literally "pops" electrons out of atoms



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and sends them flying around the circuit. It must always be borne in mind that these devices do not create electrons but merely push along the electrons already existing in the wires or other *conductors*.

Electrical Conductivity

No one has yet been able to furnish a complete explanation of electrical *conductivity*, though such an explanation must be sought in the complexities of atomic structure. All metals are *conductors* of electricity. (Silver is the best conductor, and copper is very nearly as good.) Non-metals and chemical compounds, in general, conduct current so poorly as to be called "non-conductors," or *dielectrics*. (Carbon and boron are two non-metals that are fairly good *conductors*.)

An electric charge evidences itself by the *electrostatic field* which surrounds it. The attractions and repulsions of electrically charged bodies are interactions of their *electrostatic fields*. Now, when an *electrostatic field* is set in motion, a *magnetic field* is generated. It is a curious thing that a *moving electrostatic field* creates a new kind of field. We cannot explain it, though Einstein has tried to do so.

Let us go a step farther and come to some things we are familiar with. Because an electron is a tiny *electrostatic field*, an electron in motion produces magnetic effects. Also, because a wire conducting electricity contains a lot of moving electrons, it is evident that such a wire is surrounded by a magnetic field. If the magnetic field surrounding a wire varies in intensity (as when the wire is conducting a-c) currents will be *induced* in adjoining *conductors*. This is the principle of *electromagnetic induction*, a principle familiar to you in the operation of generators and transformers.

We cannot form a clear mental picture of invisible fields, of course, but we find it helpful to note the differences between *electrostatic* and *magnetic fields*. *Electrostatic fields* involve only electric charges—negative and positive—and are

capable of being transferred from one body to another by transmission through wires.

Magnetic fields, on the contrary, cannot be "discharged" in this way, and they make their presence felt only by attracting bits of iron and by inducing electric currents whenever they "cut" electric *conductors*. Magnetic polarity is designated as North and South, and, like electric charges, two dissimilar magnetic poles attract each other and two similar poles repel.

The magnetic field of a permanent magnet is caused by the swiftly revolving electrons in unidirectionally oriented iron atoms. It is believed that the carbon atoms in magnetized steel prevent the iron atoms from twisting about in all directions, which would result in a net cancellation of the magnetic fields of the individual atoms. If we heat a magnet red hot, the iron atoms become so agitated that they shift about, and the magnetism disappears.

Electrical Units

The absolute *quantity* of electricity in any body is obviously the number of free electrons present in the body. Now the charge of a single electron is much too small to be measured by ordinary electric instruments, so electrical engineers employ the *coulomb*, the combined charge of 6.28×10^{18} (6,280 quadrillion) electrons, for their unit of electrical quantity. Long

before scientists were able to count electrons, the coulomb was defined as the charge held by a condenser of 1-farad capacity when the potential difference between the plates is 1 volt.

The coulomb is so large a quantity of electricity that no condenser in any amplifier is big enough to hold it. In fact, if it were possible to charge two small spheres with one coulomb each, and if these were placed a yard apart, they would attract or repel each other with a force of more than a million tons! It would require 170 horsepower-hours of energy to place a charge of 1 coulomb on a metal sphere 4 inches in diameter. The sudden release of the charge would rival the explosion of a carload of dynamite!

And yet (truth being stranger than fiction) slightly more than one coulomb of electricity flows through a burning 100-watt, 110-volt electric light bulb every second.

We do not use the coulomb very often as a unit of measure in practical sound system work, but it is important to us as the basis of the *ampere*, the unit of current *intensity*. In fact, the ampere is defined as a current-flow of 1 coulomb (6.28×10^{18} electrons) per second.

What about the *volt*? Just as water flowing through a pipe may be under high or low pressure, so may electricity flowing through a conductor. Electrical pressure is spoken of as "electromotive force" and is measured in volts. Voltage has nothing to do with the intensity of current-flow, for that is always measured in amperes.

Power is the rate at which energy is expended. Electric current is a form of

(Continued on page 8)

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energy, and the rate at which this form of energy is used up is measured in *watts*. To calculate electrical power in watts we have only to multiply the electrical pressure (volts) by the amount of electricity flowing per second (amperes):

$$\text{Watts} = \text{Volts} \times \text{Amperes}$$

Suppose that an exciting lamp supplied by current of 10 volts pressure is found to pass $7\frac{1}{2}$ amperes. How much power does the exciter consume?

$$\text{Watts} = 10 \times 7.5 = 75 \text{ watts}$$

When the number of amperes passed by a device and the power it consumes are both known, it is an easy matter to find the voltage at which it operates. We simply divided watts by amperes, as shown by the following formula.

$$\text{Volts} = \frac{\text{Watts}}{\text{Amperes}}$$

And to find amperes:

$$\text{Amperes} = \frac{\text{Watts}}{\text{Volts}}$$

Electricians use the letter P to represent watts (power), E to represent volts (electromotive force), and I to represent amperes (intensity). These symbols are used so frequently in electrical work of all kinds that it is a good idea to memorize them. The three formulas just given may accordingly be "abbreviated" in the following way:

$$P = EI \quad E = \frac{P}{I} \quad I = \frac{P}{E}$$

For certain purposes the ampere is too large a unit of current intensity. When measuring very small currents we use the

milliampere—one thousandth of an ampere. The plate current of voltage amplifiers is measured in milliamperes.

Likewise, small electrical pressures are measured in *millivolts*, and small expenditures of electrical power in *milliwatts*, or even *microwatts*. (A microwatt is one millionth of a watt.) But when we are dealing with thousands of watts we use the *kilowatt*—one thousand watts.

Energy Units

In the interest of accuracy we must distinguish electrical energy from electrical power. A 100-watt lamp consumes 100 watts of power, of course, but the *amount of energy* used up depends on *how long* the lamp is burned. If we burn the 100-watt bulb for 1 second, we use up 100 *watt-seconds* of electrical energy. A 50-watt bulb burned for 2 seconds also consumes 100 watt-seconds of energy.

The watt-second is frequently called the *joule*. For most purposes the joule is too small a unit, so the *kilowatt-hour* (1000 watts for one hour) is employed.

This unit is a favorite with the electric utilities, for their service meters register the number of kilowatt-hours of energy consumed by their customers.

Series and Parallel Circuits

No matter how efficient an "electron pump" we have, current will not flow in a conductor unless a complete electric *circuit* be established. A battery or generator forces electrons *out*, to be sure, but other electrons must move *in* to take their places if there is to be a flow of current. In other words, current will not flow along a wire unless there be a *potential difference* (voltage difference) between the ends of the wire.

In the *series circuit* all the current-consuming components are connected one after the other, hence there is only one path for the electrons to follow. Since there is only one path in a series circuit, *the current-intensity (amperes) in each part of a series circuit is the same*.

But some of the electrical pressure (voltage) is lost in pushing electrons through each component of the circuit. Across the terminals of each device connected in the circuit, therefore, we find a *voltage-drop*, measurable with a voltmeter. The sum of all the voltage-drops equals the original electromotive force supplied to the circuit.

Suppose a series circuit contains a resistance coil, a lamp and an ammeter. Connecting a voltmeter to the terminals of the resistor we find a "drop" of 36 volts. Next we test the lamp and find a drop of 73 volts. The drop across the terminals of the ammeter is 1 volt. What voltage is being supplied to this circuit by the source of current?

$$36 + 73 + 1 = 110 \text{ volts}$$

The *parallel circuit* has two or more branch circuits which allow electrons to travel in two or more paths simultaneously. The current (amperes) flowing in one branch may be different from the current flowing in another. The branch having the greatest resistance will have the least flow of current, and *vice versa*.

A parallel circuit has much in common

(Continued on page 29)

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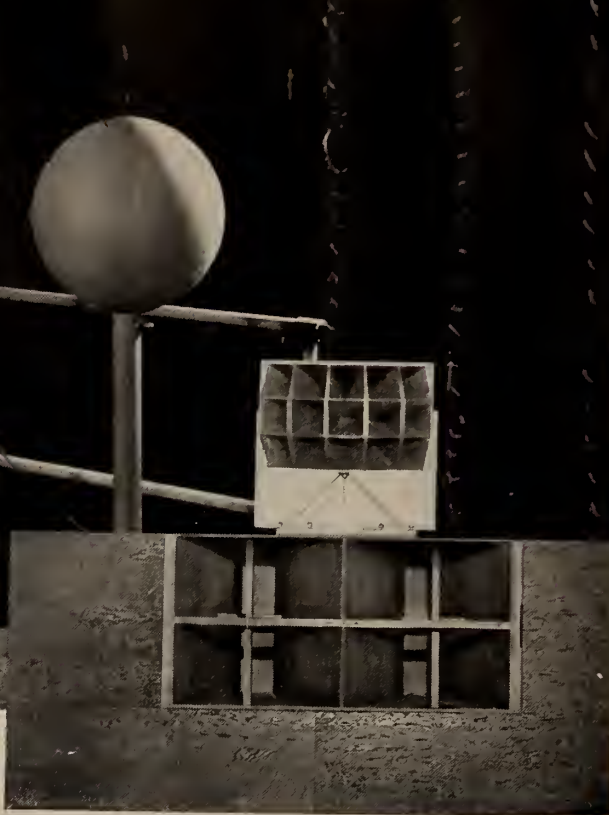
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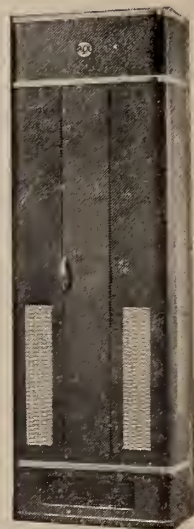
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The 'New Look' in Photocells

By RAYMOND A. DUSAULT, JR.
Radiant Lamp Corporation

THE commonplace observation that good things come in small packages might very well apply to the newest and most recent development in the photoelectric cell field, the lead-sulfide photocell. A mite of a tube in size, this photocell promises to do big things for the motion picture industry. Since this cell was announced last Spring, considerable interest in it has been shown by projector manufacturers.

Of importance to the entire projection field is the need to know more about these cells and what they will do to improve performance. Rather than go into a detailed technical study of the cells, the writer feels that a broad general discussion of the unit and its advantages would be of most interest to IP readers.

Called the "PbS cell" for short (a chemical term abbreviation), the lead-sulfide cell is of the photo-conductive type. This means that the resistance of the cell *decreases* under the influence of

light. Although this property of photo-conductive lead-sulfide (in the form of Galena) was known as early as 1900, it has been only within the last few years that improvements in sensitivity have been made to the point where it is now practical to apply production techniques to the commercial manufacture of these cells.

The PbS cells differ from the conventional photocells in use today in the manner in which they convert light into electrical energy. The standard cell now in general use is known as the photo-emissive type and depends on a different phenomena for its operation. In either case, however, the end results are the same in that light from the exciter lamp, modulated (varied in intensity) by the film soundtrack, strikes the photocell where the light fluctuations are converted into electrical current. This feeble current is amplified and then piped to the loudspeakers.

The lead-sulfide photocell has remarkably stable electrical characteristics. This feature will result in the cell finding applications in numerous other fields such as burglar alarms, phonograph pickups, tabulating machines, *etc.* However, since we in the motion picture industry are primarily concerned with its use for sound reproduction, we will consider some of the properties and advantages of the PbS cell as compared with the conventional photo-emissive type.

PbS Cell Physical Characteristics

The PbS cells are the smallest commercial photocells developed to date for the sound projector industry. The cell is available in several sizes, the smallest of which is only a little over one inch long by $\frac{1}{4}$ inch in diameter. The extremely small size of these cells is of primary importance to the manufacturers of 16-mm equipment, resulting in space economy and permitting the cell to be mounted in hitherto inaccessible places. Fig. 1 shows the outline and dimensions of a typical PbS cell.

The frequency response of the PbS cell is about the same as that of the photo-emissive gas photocell, being fairly flat to 10,000 cycles and then dropping off rapidly at higher frequencies.

Whereas photo-emissive cells tend to change their sensitivity with age and with exposure to strong radiation, experience to date with the lead-sulfide cells seems to indicate stable electrical characteristics and sensitivity both with age and with prolonged exposure to strong radiation. The PbS cells are not limited by exposure to ultra-violet light, as are the photo-emissive types with S1 surfaces.

The PbS cell is completely non-microphonic, as contrasted with conventional types. The lead-sulfide coating is applied inside the cell directly on the glass.

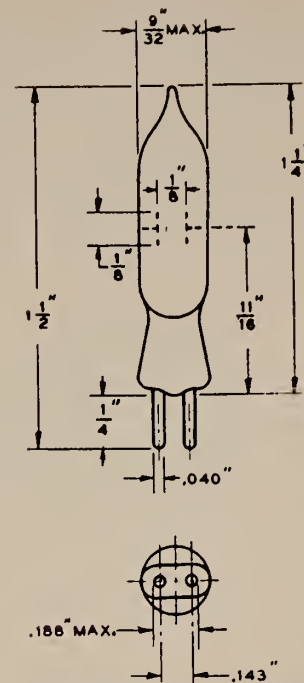


FIG. 1. Dimensions of a typical lead-sulfide cell, which is inserted directly into a socket without the need for a base.

There is practically no way that vibration might cause microphonics in these cells. This is not true of the photo-emissive units, however, due to their type of construction. In the latter type the anode and cathode are usually supported on stiff wires attached to the bottom of the cell. Although these are made as rigid as possible, it is not unusual for vibration to vary the displacement of the cell elements enough to cause unwanted modulation of the sound.

Spectral Characteristics

The PbS cell has an extended spectral response in the infra-red region up to

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approximately 30,000 Angstrom units (A.).

Translated in everyday language, this means that the PbS cell is able to utilize a much greater portion of the light output of the exciter lamp, which, in properly designed equipment, means greater signal strength.

The standard photo-emissive types will not respond to infra-red much above 10,000 A., which means that a good part of the light output of the exciter lamp cannot be utilized.

Because of the greater signal strength of the lead-sulfide cell, it is possible to economize on amplifier components to some extent, which will lower manufacturing costs. This is particularly desirable in the highly competitive 16-mm field. Because of the cell's extended infra-red response, it is possible to run the exciter lamp at lower voltage than normal without sacrificing signal strength. This prolongs considerably the life of the exciter lamp.

In applications where low noise levels are desirable, particularly in sound reproduction, the lead-sulfide cell has an advantage over the photo-emissive gas tube, the noise level for a typical PbS cell being of the order of a few microvolts or less. In some applications a reduction of up to 20 db in noise level

TABLE A
Signal-to-noise ratio for lead-sulphide cells of varying sensitivity areas.

Area in Inches	Signal- Noise Ratio, db	Resistance Range	Recom- mended Voltage
1/16 x 1/16	52-72		10.0- 22.5
1/8 x 1/8	46-66		22.5- 45.0
1/4 x 1/4	40-60	1-20 meg.	45.0- 90.0
1/2 x 1/2	34-54		90.0-180.0

has been gained over that obtainable with a gas tube. This was accomplished with no loss in signal voltage as compared with the gas tube.

Since there is no anode or cathode in the PbS cell, the electrodes are non-polarized. It is suspected that the cell will be less subject to interference from stray magnetic fields, such as from motors and transformers, and tests on this are now being conducted.

In some projectors the PbS cell is directly interchangeable with existing types; while in others small changes have to be made in the optical system in order to utilize to the fullest extent its advantages. The reason for this is that whereas in the photo-emissive type it is desirable to illuminate as much of the cathode surface as possible, just the reverse is true of the PbS cell, where

efficient operation depends upon concentrating the light over a small area (see Table A).

As may be seen from the outline and dimensional sketch (Fig. 1), these cells are manufactured in several different envelope sizes, with sensitive areas ranging from 1/16 x 1/16 inch up to 1/2 x 1/2 inch. Generally speaking, it is advantageous to use as small a sensitive area as possible, within the limits of the projector optical system. The PbS cells are now available with standard 3-pin bases for direct replacement of the photo-emissive cell in some types of projectors.

This new cell is especially well-suited for use in 16-mm sound projectors and is now being used by several manufacturers of such equipment. Where new equipment is being designed, provision may be made for efficiently utilizing all the important features of the cell.

There is no doubt that this little giant of a photocell will exert a powerful influence upon sound-film reproduction, particularly in the 16-mm field, in terms of better sound at lower cost.

A special new type of exciter lamp is now being developed for use in conjunction with the PbS cell. Details of this new lamp are necessarily restricted at this time, but these data will be published in a future issue of IP.



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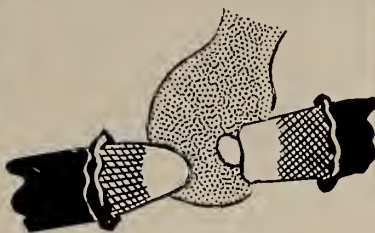
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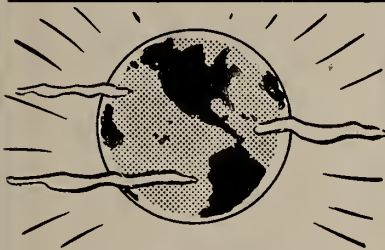
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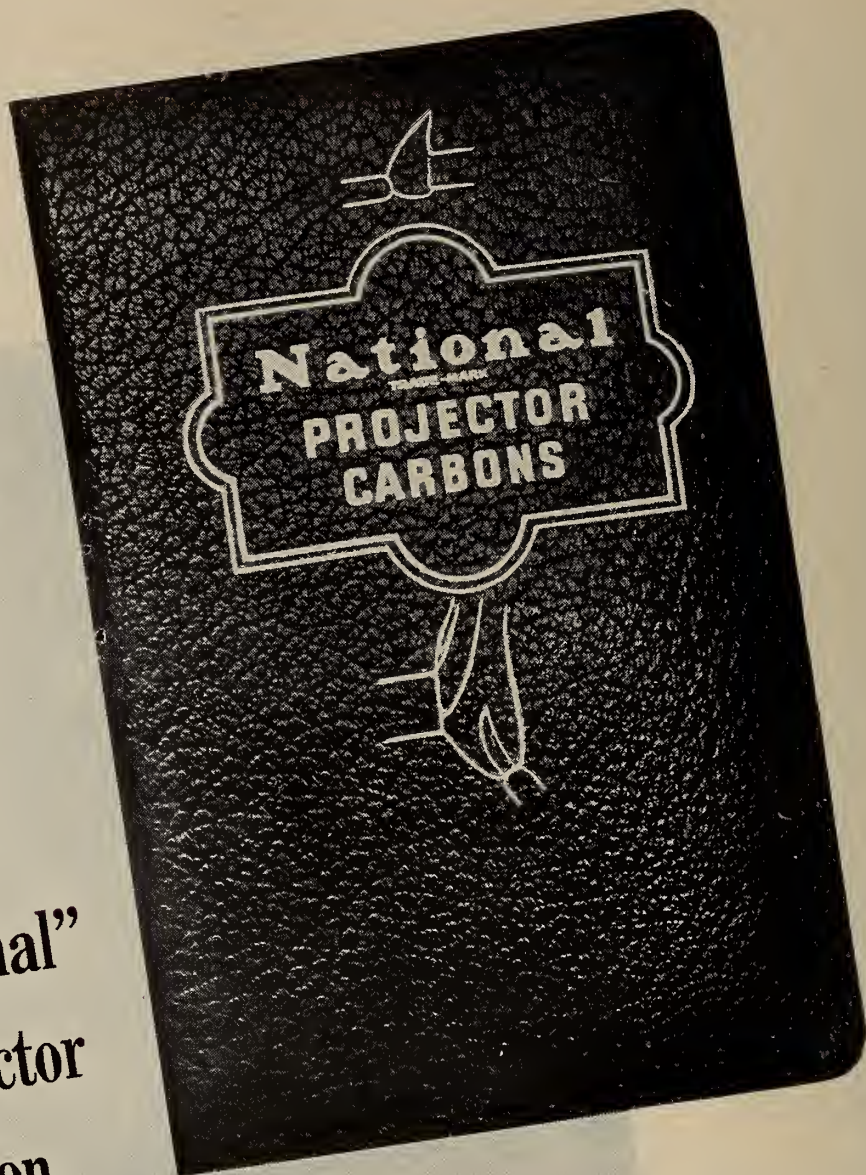


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The handbook will be distributed through the Cleveland office of National Carbon Company, Inc., Post Office Box 6087, Cleveland, Ohio.

Fallacy of the 'Persistence' Theory

SOMEbody once said "Cinematography is based on the phenomenon of persistence of vision," and the statement has slavishly been copied in books and articles ever since. I have even been guilty myself. But prolonged consideration has led me to the opinion, *pace* the experts, that this statement is inaccurate.

What is persistence of vision? The stock illustration is that if you rapidly rotate a glowing object in a darkened place you will see a ring of light. It is the effect, for instance, given by the glowing end of a rapidly rotating catheterine wheel. The reason is that seeing is a multiple process, the light rays being directed by the eye lens on to the sensitive retina where certain chemical changes immediately take place.

Continuation of Seeing

Until the stimulated area returns to equilibrium, the eye still continues to "see" at that point, and the vision is said to persist. If you enlarge the size of the circle through which you rotate your light, the ring becomes incomplete, but the effect is of a bright light followed by a curved tail, as the effects of the stimuli to the retina die away.

For this reason, say the pundits, if you present a series of nearly identical pictures to the eye, they will merge into one another and you will secure an illusion of movement.

This reason is so plausible that it has, so far as I know, been accepted without question for many years. But certain facts appear to disprove it.

Physical vs. Mental Reactions

For one thing, it is well known that while a picture frequency of 16 per second is sufficient to secure an illusion of movement in the majority of cases, it is insufficient to avoid an appearance of flicker. So, while you may record your movement at the rate of 16 pictures per second, you have to take steps to present more than 16 pictures per second to the eye, and a projector therefore has a flicker shutter which cuts off each frame twice while it dwells on the screen, and the eyes of the audience actually receive 48 light impulses per second, with a change in content at each third impulse only.

It would appear, therefore, that whereas 48 impulses per second are necessary to satisfy the physical requirements of the eyes, only 16 changes per second are necessary to satisfy the mental reactions of the spectator.

But more conclusive is the projection

By GEORGE H. SEWELL

Wherein a prominent member of the Royal Photographic Society (England), writing in the British Journal of Photography, provocatively challenges the "gospel" of the theory of persistence of vision as the most vital factor in the motion picture process.

of cartoons consisting of black lines on a white ground. When such a picture is projected, nearly the whole area is white and only the small part representing the black lines fails to stimulate the retina. As soon as the next picture comes on the screen, assuming that the lines have moved to a new position, then the absence of stimulus resulting from the lines on the previous frame is flooded out of existence by the whiteness from what is now part of the white background of the picture. Therefore, persistence of vision can play no part in the illusion of movement.

Past Experience Motivation

My own theory is that the illusion of cinematography is entirely due to a series of instantaneous mental decisions based on previous experience.

All our lives we have lived in surroundings where things move around us, and

our brains have been trained to recognize such a concept and all its implications.

For example, you are looking at a person standing a few yards away, glance down at a book or a document, and then when you look up the person is two or three feet to right or left. You do not indulge in any conscious mental analysis of this state of affairs, but immediately conclude that it is the same figure and the person has in fact moved from one place to the other.

[Your conclusions may not always be accurate, which is the reason why some stage illusionists are able to produce such apparently bewildering results.]

It is not so very far from this to the ordinary phenomenon of the ciné screen, the only difference being that your impressions are received at much more frequent intervals and are much closer together in shape, size and position. In fact, if these three factors are not sufficiently integrated, the illusion may break down.

Shape, Speed, Direction of Motion

A sudden change of shape may cause you to be quite puzzled momentarily, and it has also been discovered that speed and direction of movement are closely connected with shape. Have you ever, for example, examined frame by frame the images of a horse jumping a fence in a steeplechase? The elongated blurs

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bear little resemblance to a real horse and rider, yet they will join together on projection to give a recognizable image of a horse and rider in rapid motion.

Certain cartoonists have discovered that if, for example, they are depicting the rapid flight of a ball, an oval shape, distorted according to rules which they have established, will give a much more accurate impression on projection than a series of correctly circular images. It would appear here that a mental as well as a purely physical process is in operation.

With regard to change of size, you all know the set of shots which have been taken by a cameraman of something approaching the camera. Because the object has taken a long time to cover the distance, the cameraman has stopped his camera a couple of times without altering its angle relative to the subject.

Interpreting Visual Images

When you project the results the effect obtained is that the subject jumps suddenly towards you on each occasion when the camera has been stopped and started. This would appear to be due to a purely mental process. In fact, the mind is always making this sort of interpretation when viewing pictures.

Imagine you prepare a series of title cards, each identical in character, but

each with its lettering slightly larger than that of its predecessors, shoot them in order, and project them. The title will not merely appear to grow larger on the screen, but will give the impression of moving forward towards you. Yet all the various cards were shot at the same distance from the camera. The effect is purely mental.

Image Displacement Effect

I have said that 16 frames per second is sufficient to give an illusion of even movement. But we all know that if you attempt to record relatively fast-moving objects close to the camera, and moving at right angles to it, the illusion breaks down. In other words, the displacement

of the images is too great, and the mind refuses to accept the statement.

There is another case where the mind insists on interpreting the evidence in its own way. I refer to the well-known effect of the wheel that refuses to rotate in the correct position, or the tank track which moves in the opposite direction to the vehicle it supports. In both these cases you have a number of virtually identical objects whose image displacement is more than half the distance between any two of them. The mind irresistibly associates each image with the nearest previous image to it, and thus the effect is of reverse movement.

If the degree of displacement is equiva-

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lent to the distance between any two of the objects, then the mind will interpret the result as lack of any movement. If it is half the distance, then the effect will be a confused doubling of the number of wheel spokes or track units, again without forward or backward movement.

Mental Interpretation Controlling

Once more it would appear that interpretation is due to a mental rather than to a purely physical process.

Incidentally, the last example is closely akin to the early experiment which is often quoted in support of the theory of persistence of vision. A small disc was prepared, on one side bearing a picture of a bird-cage and on the other side a picture of a bird. When rapidly spun by means of two string loops at opposite sides of its periphery, the illusion was created of the bird in the cage.

That is, I concede, a true demonstration of persistence of vision, but in my submission it proves nothing more than that.

I should welcome other opinions on my own theory.

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Hollywood Local No. 659, I. A. T. S. E.**

Dissent, Approval Anent 'Persistence' Theory Fallacy

So slashing an attack on one of the "sacred cows" of motion picture technology as was launched by Mr. Sewell was certain to evoke spirited replies. Typical of these rebuttals are these communications, addressed to the editor of the British Journal of Photography, which typify the general opinion.

MR. GEORGE H. SEWELL raises an interesting point in his article "The Fallacy of the Persistence Theory," but he does not prove the fallacy nor disprove the theory. One may safely say that we live in a world of darkness: "light," as we call it, does not exist. Electro-magnetic radiation of a limited band of wavelengths stimulates the retina, which sends impulses to the brain, and the sensation experienced is what we call "light."

An image so formed in the brain can persist for years; but there is another kind of persistence due to the prolongation of a physico-chemical reaction in the retina. Without the latter, stereoscopic vision would be rather difficult, as would also the perception of motion.

'Yellow Spot' Area of Acute Vision

As is well known, there is an oval area 2 x 1 mm called the "yellow spot" in the centre of the retina. The transmitted image within this spot appears more definite and brighter than that of the remainder of the retina.

In the center of the yellow spot, vision is still more acute. This area (fovea centralis) contains cones only, and the limit of vision is set by the angle subtended between two adjacent cones, equivalent to seeing 1/400th inch at a distance of 9 inches. Gaze intently at a full stop on this page and only a part of it is projected on to the fovea.

Each eye has six muscles which quickly rotate the eyeballs sympathetically on vertical or horizontal axes so that the same point on any part of an image falls exactly on the centers of both retinas. On viewing a scene or picture the eyes are continually on the move, elevating,

depressing, traversing, and converging the optical axes on to various points.

Estimation of Dimensions

The muscular effort necessary to converge the optical axes onto a point enables us to estimate distance, relative or actual, from long association and practice. Height and width are estimated from the effort made to elevate, depress, or traverse. At the same time two other muscles in each eye come into play: one to focus the lens, the other to open and close the iris.

The ciliary muscle which changes the shape of the lens works in sympathy with the rectus muscles which rotate the eyeball, so that the lens is habitually focussed onto the point of convergence, or point of binocular fixation. Incidentally, these two functions have to be dissociated when using a stereoscope. The iris, reacting to variations in intensity falling on the retina, regulates the "light" to within tolerable limits.

'Easy on the Eye' a Fact

Normally, we were not conscious of these muscular actions, particularly when the picture is pleasing. Art depends to a great extent on the consciousness effort to scan a picture or object. "Easy on the eye" is founded on fact. Rhythmic muscular efforts are pleasing; non rhythmic changes irritating; thus there is a preference for sweeping curves and gradual changes in tone.

Motion cannot be visually estimated accurately when an image travels across the retina: one part of the image must fall continually on the yellow spot at least in order that the eyes may be traversed in direction of travel, and from the muscular effort necessary an estimate is made of the relative or actual speed, in addition to an estimate of distances.

News films often provide amusing evidence that the neck muscles are also brought into play by spectators at a tennis match or motor race. When motion is too rapid or ocular fixation casual, there is a fleeting image recorded which is associated with speed but with no effort at estimation.

Take, for example, a windmill: it is easy to follow the sails with a circular muscular action. On the other hand, the blades of an electric fan are impossible to follow, and the result is a blur, the speed being indeterminate.

Motion toward or away from the observer is estimated by stereoscopic prin-

ciples, i.e., the change in convergence and focus; also by a change in size estimated by scanning the moving object. Hence the illusion cited by Mr. Sewell.

Muscular Action of the Eye

Another set of muscles open and close the eyes. One muscle actuates the lid so that it can sweep the anterior surface quickly. When the lids are down for a certain length of time, stimulation of the retina is absent and all other eye muscles then relax, ocular fixation ceases, optical axes diverge to near parallel, and so registration is lost.

Since the lids must sweep down and up every ten seconds, loss of fixation would be very frequent and irritating were it not for persistence of vision. A flick of the eyelid takes about 1/10th second.

Maintaining Ocular Fixation

Radiation to which the retina is sensitive causes a physico-chemical reaction, a release of energy, lasting about 1/8th second more or less, according to intensity. A high-intensity flash can, of course, produce quite a long persistence due to a desensitization of the retina before the iris muscles can respond.

The main function of the persistence phenomena is to help maintain ocular or binocular fixation. We can blink every

ten seconds without undue fatigue. But prolong the dark period by blinking slowly, then all the eye muscles relax: the irises open, optical axes diverge, and the lenses change to infinity (if the fixation point was previously nearer).

Projected Image Periodicity

Simple experiments prove this relaxation. Hold the head level and gaze fixedly at a near elevated point; then close the eyes for a second. On opening there is a conscious effort to elevate and converge the optical axes, to adjust the irises, and to focus the lenses on to the near point. The experiment may be repeated on a point on the horizon to the extreme left or right. Reaction will vary according

to the normality of the eyes and image brightness.

With motion picture projection of too low a periodicity or, to put it more correctly, with dark periods of too great a length, there is eyestrain which is almost entirely due to muscular reaction. When the periodicity is high enough, muscular tension settles down to an average value. This is equivalent to the quiescent state of a larger muscle under the influence of a high-frequency electric current, or analogous to a properly damped meter movement indicating an average value of pulsating electric current.

Persistence of vision is essential at all times, particularly when viewing motion picture films of the intermittent kind. Television screens can exhibit an artificial phosphorescent persistence which might be a useful addition to the ordinary motion picture screen.

Motion is recorded by the camera in a succession of interrupted pictures. The observer senses that motion through the muscular effort of following the image in whatever direction it may take. When the successive images are sharp and the motion rapid, the eyes will follow in a series of jerks.

If the images are elongated in the direction of travel, the eyes will join up the end of one with the beginning of the next, and so the muscular effort will be less jerky. Persistence of vision helps to keep the eyes on the right track, although they are sometimes deceived when a wheel apparently turns the wrong way round.

Muscular Action Controlling Factor

Referring to the black line on white background cartoon quoted by Mr. Sewell, surely it is intended that the second image should obliterate the first, and so on. On the arrival of the next picture, which will be brighter than its fading predecessor, the gaze will shift in the right direction, ocular fixation being maintained during the dark period by persistence of the retinal image.

Once an estimate of the speed of
(Continued on page 36)

Best Wishes For 1949

from

**DETROIT MOTION PICTURE
PROJECTIONISTS LOCAL NO. 199**

I. A. T. S. E.

Season's Greetings

NATIONAL CARBON COMPANY, INC.

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TELECASTS

New RCA 16-mm Projector for Tv Studio Use

A new RCA 16-mm film projector, specially designed for operation with a Tv camera and facilitating the use of newsreels, a wide variety of short film subjects, and film commercials for low-cost Tv programming, is now available.

This projector, the RCA Type TP-16A, has been modified to project motion pictures onto the mosaic of a pickup tube in a Tv camera.

Tv standards and proper synchronization require transmission of 60 fields (30 interlaced frames) per second, as contrasted with the motion picture film standard of 24 frames per second. This conversion is accomplished in the TP-16A by "scanning" the first frame twice, the second frame three times, the third twice, the fourth three times, and so on. The average rate, then, is $2\frac{1}{2}$ scannings per frame, which, at a film speed of 24 frames per second, provides 60 scanned fields per second.

Faster Film Pull-Down Used

To successfully employ the 2-3-2-3 scanning sequence, the "pull-down" time (that is, the time required to pull a new frame into place), must be shorter than that employed in standard projectors. The "pull-down" interval in a standard projector is about $\frac{1}{6}$ th the total "frame cycle." If this interval were used for Tv, alternate pull-downs would slightly overlap the scanning cycle and would cause annoying "travel ghosts."

To avoid this, the spur gears ordinarily used in a projector have been replaced in the TP-16A with a set of elliptical gears, which cause the claw mechanism to travel about 50% faster in the downward direction. As a result the pull-down time is reduced to about $\frac{1}{8}$ th the "frame cycle," the film remains in the film gate for $\frac{7}{8}$ ths of the cycle, and the pull-down can not coincide with the projection interval.

The optical projection system of the TP-16A consists of a 1000-watt airblast-cooled incandescent lamp, a silver-coated Pyrex glass reflector, a large two-element aspheric condenser lens, and a "coated" $3\frac{1}{2}$ inch f/2.0 projection lens. This system provides ample illumination on the mosaic of the camera pick-up.

Several unusual features are incorporated in the sound system of this projector, one of which is the use of radio-frequency voltage on the exciter lamp filament. This type of power source insures a constant beam of light which prevents hum and noise from being introduced by the lamp itself. To insure permanently accurate alignment, the exciter lamp mounting and sound carriage



New large-screen RCA Tv projector (TLS-86) produces 8 x 6 foot images at 15-foot distance from screen. Sales through RCA theatre supply dealers.

are die-cast in one piece. Another feature is the use of the RCA rotary stabilizer on the sound drive.

Projector-Tv System Sync

A fundamental requirement of a Tv film projector is that it must synchronize with the Tv system. The TP-16A uses a common source of power for both the Tv synchronizing generator, which drives the scanning beam in the camera pickup tube, and for the motor which drives the projector shutter. To make sure that the shutter will be "in step" at all times, the motor used is a specially wound 3-phase synchronous type with d-c field excitation, always "locking" in phase at exactly 3600 rpm.

Controls mounted on the projector provide maximum flexibility of operation for the unit. These include stand-by, emergency run, start, stop, and remote controls.

When the stand-by control is operated, low voltage is applied to the projection lamp, the blower motor operates, and the pre-amplifier is warmed, as this is the normal "warmup" position.

When the remote switch is closed, "start" and "stop" controls at the remote location may be used to control operation. These circuits operate through relays and a master contactor mounted on the pedestal of the projector. Also mounted on the pedestal are 115-volt, single-phase, and 220-volt, 3-phase circuit breakers.

The TP-16A projector is entirely self-contained, and, with the exception of the film feed arrangement, is entirely enclosed. The projector is mounted on a heavy case-base frame. This frame in turn is mounted by means of leveling screws on a light-weight pedestal, which provides a convenient place for mounting the controls and field supply for the special, 3-phase motor.

Par's Package Tv Film Shows

The trend among Tv time buyers is away from network programs in favor of market-tailored sales messages, a move which highly favors Paramount's Tv film transcription service, said George Shupert, director of commercial operations for Par's Tv subsidiary. Easily 9 out of 10 Tv shows can be filmed and shipped to stations throughout the country, said Shupert, who added that the "time element is not as important as is

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CANADA

generally imagined except for hot news flashes and sports events."

Tv transcription systems in use in Paramount's New York headquarters today cost more than \$250,000, it was revealed, but duplicates at an average cost of \$35,000 each will be installed soon in Chicago and Los Angeles, where Par operates Tv stations now.

Video shows can now be filmed in Par's New York setup at a cost of from \$500 to \$1,000 for studio time and recording of a 30-minute program. This figure is exclusive of talent, scenery, props and other production overhead. Program will be available in either 35- or 16-mm. The recorded program would be ready within a minute after shooting is finished. The same show produced in a small motion picture studio might cost 10 times as much, it is estimated, and it would be at least a week before the producer could see his footage. Par's recordings are said to be of first-rate newsreel quality and wholly acceptable commercially.

No Tv Permits For Movie Majors

No opposition to any move of the FCC will be forthcoming from the U. S. Dept of Justice, but the latter has indicated that it would be "greatly surprised" if the communications body granted any Tv station permits to any of the major film companies who stand convicted of anti-trust activities.

Paramount asserts that there is no basis in law for the FCC to refuse a Tv permit to

any qualified party; but nobody expects the Commission to be swayed by this appeal. Net result of FCC stand will be to effectively and completely block out of the Tv picture all the major film companies, thus leaving the field clear for non-movie interests such as radio broadcasters and newspapers.

Now or Never on Theatre Tv, Hyndman Tells Film Group

If the motion picture industry is ever going to do anything with respect to utilizing television, now is the time to do it, Donald Hyndman, past president of the SMPE and chairman of its Theatre Television Committee, told the Film Forum of the American Television Society. Both the direct projection and the film storage systems are available, Hyndman pointed out, but their mere existence is of no practical worth.

If the industry is to obtain such channels for big-screen video transmission, he declared, it must promptly request their assignment. He foresaw "little likelihood that a vague expression of general interest or intent will lead to channel assignments."

In stressing the need for immediate action. Hyndman recalled that, because the industry did not take a concrete interest in terms of experimentation, it lost its specific frequency assignments. Now, he added, certain frequencies can still be used by the industry for experimental purposes, but its position is weaker from the standpoint of obtaining

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CENTURY PROJECTOR CORP.

New York, N. Y.

a permanent part of the radio-frequency spectrum for theatre television purposes.

Par Denies Prompting DuMont Policies

Paramount has "exercised no control over the affairs and operations of DuMont, and DuMont has neither sought nor received the benefit of Paramount's operating experience in Tv or other fields," the picture company told the FCC recently in answer to Tv interests which are opposing the granting of further video permits to Paramount.

ABC Buys Coast Studio for Video

American Broadcasting Co. has purchased from Warner Bros. the old Vitagraph studios in Hollywood as a center for the former's Tv operations on the West Coast, notably for the production of motion pictures especially for video showings. The studio contains two giant sound stages, one the largest in Hollywood and the other only slightly smaller.



Season's Greeting

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(Motion Picture Cameramen in the East)

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NEW YORK, N. Y.

The New British SUPA Projector

By H. HILL

Acceding to requests of American projectionists for further information regarding this unorthodox yet intriguing assembly, a one-time British projectionist, well acquainted with all European projection gear, explains to his American friends some interesting aspects of this modern mechanism.

THE British-made B-T-H* SUPA sound-film projector, current focal point of interest in cinematic technical circles, is at once pleasing to the eye and the essence of simplicity to operate. It is a rather difficult machine to describe. Born in the post-war era and embodying many novel ideas, devices and refinements make it complicated and most interesting. Indeed, the word "revolutionary" may be aptly applied to the SUPA assembly.

Recognizing the challenge posed by most standard sound-film projectors, SUPA designers set out with a fixed purpose of making everything solid and extremely reliable. Naturally, finality has not yet been reached: the SUPA still is undergoing the troubles characteristic of most new machines. When stabilization is reached, however, it is thought that for sheer operating ease and foolproof running, the SUPA will be a most worthy addition to the world's fine projection assemblies.

Most significant about the outfit is the absence of visible cable leads, conduit or flexible metallic tubing. All current control and amplification is accomplished within the cubicles, thus it was arranged that all conduit tubes be introduced into the cubicles from underneath. The available space within the cubicles being ample, it was practicable to place all arc contactors and exciter lamp supplies in one assembly, the amplifiers in another—an idea both original and good.

To the uninitiated the ensemble looks so solid and imposing that, apparently, facility of operation—namely, positive or

negative angle of tilt—has been overlooked. Actually, the main cubicle rests within a rectangular outer casing, and the former can be raised at front or rear by means of jacks. SUPA designers concluded that the average projection angle (tilt) was $7\frac{1}{2}$ degrees, thus the machine when installed and resting "level" on a projection room floor, has a "natural" angle of $7\frac{1}{2}$ degrees.†

Projector Soundhead Unit

The unit construction of visual projector and soundhead insures compactness, correct alignment and stability. Tracing the film path from the double-walled upper magazine—protected by a celluloid fuse link and having a diffused light passing through the spool (reel) from side to side (an idea used by the writer in 1931)—we come to a 6-frame upper sprocket and thence to the curved film trap. Superior in some ways to the parallel or orthodox hinged type, the movable part carries the aperture and the film trap shoes, plus a special framing aperture. The stationary part of the film trap carries the door pads which, of a light springy type, are speedily removable for cleaning or replacement.

The film is not held to the intermittent sprocket by the customary shoe, but by a single roller similar to earlier B-T-H and Kalee models. The lower sprocket, an 8-frame type, is also the holdback sprocket, and the usual constant speed sprocket is omitted, the electrical stabilizer being considered to be adequate. A large "inching knob" is conveniently placed at the operating side of the machine, its direction of rotation being engraved upon it; and another advance in design over previous B-T-H models is the positioning of the framing knob on the operating side. All sprockets can be removed, reversed or replaced within a few minutes.

[† Eo.'s NOTE: Mr. Hill and his British colleagues will undoubtedly be interested in knowing that the average projection angle in America is 15 degrees, which "tilt" is easily accommodated by American projectors without recourse to jacks or any other accessories. In fact, any Simplex E-7 may be installed in this fashion in a room having up to 28 degrees projection angle, and it is a fair assumption that other American equipments match this figure.]

The film enters the lower magazine *via* a fire trap, with the lower spool being actuated by a heavy-type friction clutch driven by a roller chain.

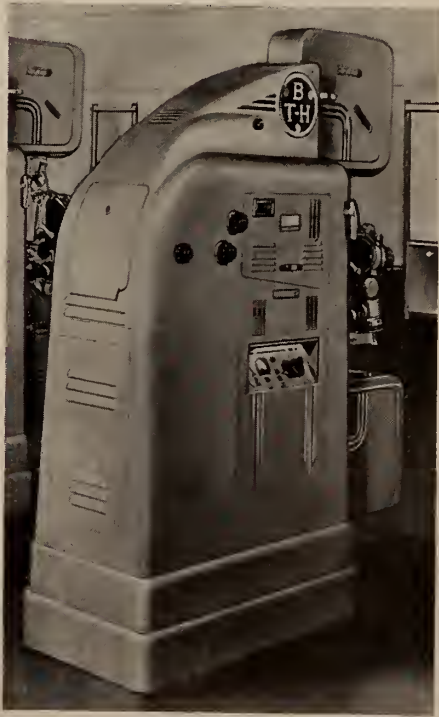
The 'Dished' Shutter

Representing one of the most efficient and interesting contributions to cine technique, the "dished" shutter constitutes an intriguing subject. As is well known, there is a limit to the size of a disc shutter; also, such a shutter *never* attains a truly parallel cutoff. Further, it is difficult in many cases to place such a shutter in close proximity to the film path. The drum or barrel type shutter *always* cuts the light beam in a parallel manner, but if it is to accept steep cone angles of light such as a convergent beam from an F:1.9 setup, then its size becomes unwieldy, not to say ugly.

The hybrid (but none the worse for it) dished shutter has the advantages of both the aforementioned types with few of their disadvantages. This shutter (Fig. 1) is driven at an angle to the plane of the film, and it operates at a distance of 1 inch from the film path. It will be noted that only one-half of the shutter enters the light beam.

The shutter is not truly one of 90 degrees, for the percentage of light to cutoff is about as 23:21. The writer holds

The imposing structure of the B-T-H SUPA sound-film projector is evident from this view of its operating side.



* British Thompson-Houston Co., Ltd.

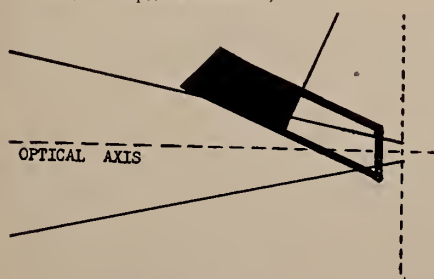


FIG. 1. Plan of "dished" shutter.

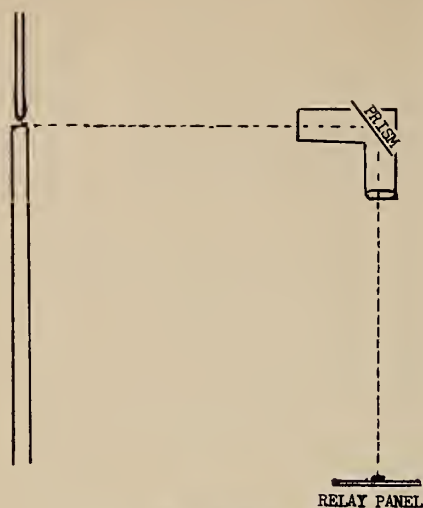


FIG. 2. Crater positioning means.

that the idea is really original. The safety shutter, unlike most other types of the friction or centrifugal variety, is placed within the dished shutter and is operated magnetically.

The SUPA Carbon Arc Lamp

This lamp employs a 16-inch mirror which, mounted in its cradle, can be completely removed from the lamphouse in a few seconds. Exactly similar to earlier successful B-T-H arcs, the negative carbon is inclined at an angle just about half way between the idealistic 135 degrees and the more popular truly horizontal type.

The carbon support columns can be slid along both ways—they are disengaged from the actuating rods by merely lifting them—and the amount of positive carbon available for burning can be seen on a calibrated scale outside the lamp.

Both negative and positive carbons are fed from a common motor which is connected in parallel with the arc terminals. The negative is operated by means of a pawl and ratchet wheel. The positive feed can be regulated according to requirements and moves either one tooth or three teeth of the ratchet wheel at each pulse.

To ensure a correct crater position at all times, the image of the positive carbon is focused by means of a prism and lens assembly onto a relay panel inside the lamp, which has fitted to it a bi-metal strip contact. When the image falls upon the strip, the bi-metal element warps and operates a contact: this causes the pawl to engage one tooth per impulse. If the image moves off the thermal element, the bi-metal strip operates in a contrary manner and engages three teeth per impulse: thus the crater is kept steady within fine limits. Fig. 2 shows the simple layout of the idea.

Novel Control Panel

The lamp runs very cool indeed, and over a long period of time mirror deterioration appears to be very slight. This

is due doubtless to the excellent metal guard for preventing copper splashing during the striking periods. The guard moves laterally as shown in Fig. 3.

Possibly one of the most interesting parts about the SUPA is the very efficient and well-designed control panel (Fig. 4). The design is self-explanatory, and a more ambitious layout would be hard to conceive. Illuminated by diffused light and placed at a convenient operating level and angle, this panel provides a means of operational ease that must be tried to be truly appreciated.

To start the arc one merely presses the "Arc Start" button and the lamp is automatically struck. The pressing of the "Run" button brings in maximum current. The motor is started by the appropriate button marked green, and stopped by a red button suitably marked.

The arclamp dowser is hand-operated, and the picture and sound are changed over simultaneously by one press button mounted on the lower magazine. Thus, the usual antics of the projectionist reminiscent of alternate and intermediate postures of the Statue of Liberty and the Hunchback of Notre Dame are eliminated.

Amplifier System Highlights

The outputs from the respective photoelectric cells are taken to two separate pentode tubes which, in turn, *via* a changeover relay, feed into an SP41 tube. This comprises the pre-amplifier (positioned in cubicle No. 2). The pre-amplifier is placed immediately underneath the control panel and is instantly accessible for service or test. The main amplifier employs two SP41's and two 11E1 tubes in class A-B push-pull. The output is 45 watts for a small theatre and 90 watts for a large house.

The B supply for the plates and screens of the two input pentode tubes, also for the photoelectric cell polarizing voltage, is fed from a stabilized unit which keeps the voltage constant within a small percentage. The monitor speaker is placed behind the grill marked "B-T-H" and

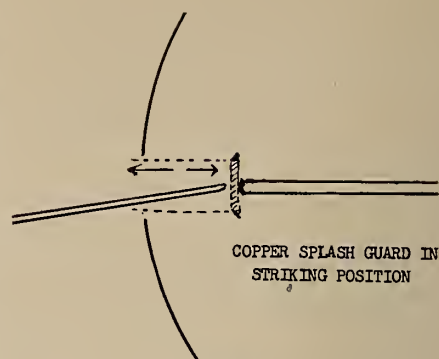


FIGURE 3

has a local volume control on the control panel. The stage speakers are of the usual type, *i.e.*, bass and h-f horns.

The Soundhead Stabilizer

Replacing the more conventional rotary stabilizer, the SUPA impedance roller is electrically driven by means of a disc motor, the speed of which is controlled by means of d-c passing through a special winding. This appears to be ingenious but, compared with usual methods, the device is thought to be intricate and liable to error or variation. Further, the resultant speech and music shows no advantage over other well-known and more simple methods.

The massive optical unit (Taylor-Hobson) is completely removable by the releasing of four screws. The exciter lamps are pre-focused and fitted to a rotary twin turret. Here, a statement made in the August issue of IP must be corrected.† A slip of the pen caused the word "track" to be used instead of "slit": this unit employs the "projection slit" method.

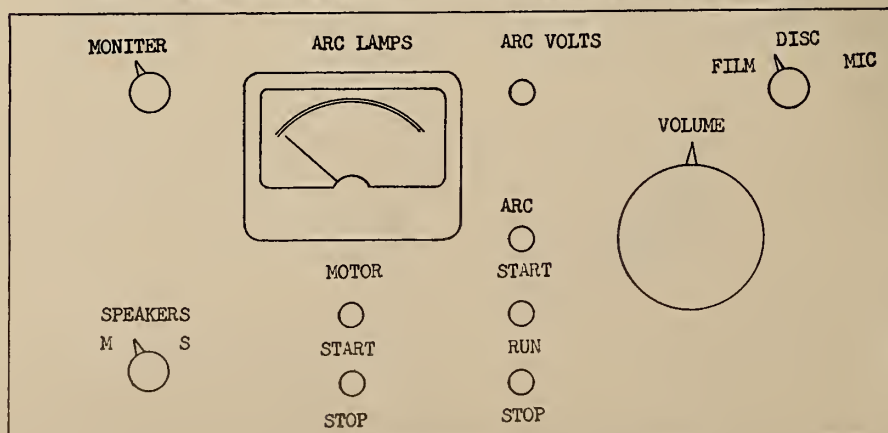
The Changeover Shutter

Mounted between the arclamp and the dished shutter, the picture changeover shutter is of great interest. Although intended to be electrically operated by the combined picture-sound change but-

(Continued, foot of Col. 1, next page)

† "Projector Progress in Great Britain," by H. Hill, IP for August, 1948, p. 18.

FIG. 4. Diagrammatic representation of SUPA projector centralized control panel.



20 Years of Theatre Sound System Servicing†

By EDWARD S. SEELEY

Chief Engineer, Altec Service Corporation

III. CONCLUSION

NEW theater speaker systems ushered in the postwar era (1945). For service, these improved speakers brought a new challenge to performance standard of the rest of the system. Hums previously inaudible were now disturbing because of the extended 1-f range of the new speakers. The improved "presence" necessitated closer attention to balance between machines, and the better overall characteristic of the speakers made imperative the best system response characteristic for the individual house.

Whether the sound equipment is of early vintage or one of the most recent, high standards of quality may require

† J. Soc. Mot. Pict. Eng., May, 1947.

NEW BRITISH SUPA PROJECTOR

(Continued from preceding page)

ton, it can also be operated manually in case of emergency. Two half-shutters are used: made of aluminum and moving through an angle of 90 degrees, the shutters are spring-loaded and ever so delicately balanced. This is quite a change from many cumbersome efforts of the past and is difficult to improve upon for slickness.

Placed at the rear of the projector and instantly accessible is the fuse panel, and a real good job it is too. Carefully marked and easy to spot, every fuse can be examined and replaced immediately. Another useful fitting is the provision of a triple female socket for engaging soldering iron or inspection lamps. Not entirely original, but good.

Overall, the SUPA represents an important milestone in projection progress. Original in conception, handsome in appearance, the essence of simplicity to operate, and reasonably accessible for service and maintenance, the SUPA has occasioned a big stir in projection circles. Whether it will be the forerunner of other unorthodox designs or remain a lone sentinel of unusual progress remains to be seen. Its designers are to be congratulated.

intelligent periodic attention to the many sources of degradation of quality or introduction of foreign noises. Even such basic factors as continuity of operation and keeping emergency situations to a minimum requires that all parts of the sound system be examined periodically, and deteriorated parts replaced or re-adjusted as required.

A characteristic of deterioration of sound quality caused by lack of proper service is the gradual manner in which deterioration occurs. Little by little performance drops and the change may be so gradual as to pass unnoticed, yet the net effect can be very serious.

Many Acute Wartime Problems

World War II presented us with many diverse problems. In spite of these many handicaps we kept the theaters running. To many a well-meaning Government agency, the motion picture theatre was just another unnecessary form of amusement in the same class with the juke box and pinball machine. All sorts of haywire arrangements were used to keep the shows running.

As various Government agencies were formed and regulations issued, our representatives were sent to Washington to interview the headquarters of these agencies in order to correlate and interpret the regulations with regard to the theatre industry. They were given a rather cool reception.

Meanwhile, other Government bureaus were busy turning out propaganda films cautioning the public regarding the conservation of materials; dramatizing the activities of the FBI; exploiting the sale of war bonds, and action pictures of our fighting forces.

The conflict between the divergent views in Washington was finally resolved by President Roosevelt, who, in a public statement, recognized the necessity of keeping the motion picture theatres operative to maintain the morale of the public and to present to them the various propaganda films. This clearly necessitated servicing and maintaining the sound equipment.

Altec representatives again visited Washington and were now more cordially received. The advantage of dealing with a single agency instead of 6000 individual theatres was apparent, and we became the focal point and the clearing house for the sound equipment needs of the theatres.

A blanket priority classification AAI was issued covering all repairs and replacement of equipment for theatre sound systems. Even with such a high priority,

a real problem remained of getting manufacturers and suppliers to furnish equipment. Our ability to purchase in volume, our distribution facilities, and close contact with all phases of the situation solved this problem economically and effectively.

Vast Parts Foraging Operation

Then, too, the equipment in closed theatres and the spare parts carried in each theatre became a vast stockpile available through the service organization to all theatres. Basements and garages of servicemen proved gold mines of now-

(Continued on page 32)



Greetings

from your friends at

MOTIOGRAPH

H. T. MATTHEWS

F. C. MATTHEWS

W. D. MATTHEWS

JOHN BULLERS

JACK BEHLKE, LOCAL NO. 110

J. E. HUCKLEBERRY, LOCAL NO. 281



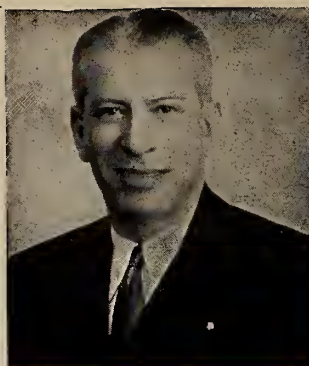
Season's Greetings

Moving Picture Projectionists'

LOCAL NO. 486, I. A. T. S. E.

Hartford, Conn.

IN THE SPOTLIGHT



By
**HARRY
SHERMAN**

TO ONE and all, wherever located throughout the world, this corner extends the heartfelt wish for the best of everything during the holiday season ahead and all through the coming year. We are very grateful for the many lifts we have had which enabled us to get over the rough spots and keep going along; and we would be happy to know that we in turn have been able to repay in kind.

It is a pleasure and a privilege to work with and for the many nice fellows who are never too busy to maintain contact with this department, and whose activities are reflected in these pages each month. We can't think of a better time to say "thanks," so here it is.

- A petition filed by New York Local 1212 IBEW seeking to have the collective bargaining unit for DuMont tele stations, WABD in New York and WTTG in Washington, broken up into a separate unit, for each city, was unanimously dis-

missed by the National Labor Relations Board. The IATSE, under whose jurisdiction DuMont workers are grouped, opposed the petition.

- An agreement has been reached between the IATSE, IBEW, and NABET (National Association of Broadcast Engineers and Technicians), along with six IA New York City Locals, which calls for "consent elections" in seven different bargaining-unit categories at the *New York Daily News* tele station, WPIX. This agreement, which has the sanction of the NLRB, provides separate bargaining units for tele engineers, film projectionists, film cameramen, film editors, film laboratory technicians, film sound engineers, and stage employees.

- John G. Humphrey, son of the late Glenn Humphrey, former business agent of Utica Local 337 and secretary for the 10th District, has been appointed instructor in electrical engineering at

Clarkson College, Potsdam, N. Y. Young Humphrey, who is a member of Local 337, served as an engineer with General Electric Co. for the past two years, and is the author of several articles on FM, one of which was published recently in *Radio-Electronics Engineering* magazine.

- Cardinal Stritch, Catholic archbishop for the Chicago area, paid a remarkable tribute to organized labor in an address to the Illinois Federation of Labor. "If it had not been for your activities through many years, the condition of labor would perhaps be no better than it was in the 1890's," he declared. "There may be those who would like to go back to the '90's," continued the Cardinal, "but we know the gains which have been made must be conserved, and to these must be added other gains to give the working man an honest family wage and a fair participation in the profits of industry."

Cardinal Stritch further declared that "there is no democracy where there is no real unionism . . . and the most cruel forced labor in the history of the modern world is found in the totalitarian countries."

- The last Scottish Rite reunion meeting of the 32nd degree of Masonry was recently held in Houston, Texas, in honor of the late Walter J. Kunz. Walter, who was secretary-treasurer of Houston Local 279 for many years, died shortly after his return from the recent IA convention.

- A story of ONE vote—a story that has been making the rounds in one form or another. In the fight for the state senatorial seat in one of our mid-western states back in 1844 the Democratic candidate, an attorney named David Kelso, defeated his opponent by *one* vote. Some time prior to the election Kelso defended a man in a shooting case and won an acquittal for his client. The client was very grateful but he was also very poor and was unable to pay for his defense. However, he paid off on election day by leaving a sick bed and driving ten miles to the nearest voting poll where he cast his ballot for Kelso. Too feeble to sit up, the sick man was taken home and a

Season's Greetings

PROJECTIONISTS LOCAL UNION NO. 407

I. A. T. S. E. & M. P. M. O.

SAN ANTONIO, TEXAS

To Our Many Friends and Members in the Craft



Greetings and Best Wishes

short time later died. Kelso won the election by *one* vote!

- In addition to his duties as projectionist at the Warner Studios and as an executive officer of Hollywood Local 165, Richard Hennley is also a columnist for the *Los Angeles Citizen*. Dick writes a newsy and entertaining column and his report on the recent national elections was a particularly interesting one.

- Joe Lynch, chief projectionist at Paramount Studios and member of Hollywood Local 165, died last month at the age of 42. He was commissioned a lieutenant in the last world war and served as a projection officer at the US Naval Photographic Science Laboratory at Anacostia, D. C. He is survived by his widow and two children, a son and a daughter.

- California District No. 2 held its annual meeting last month at Christian's Cafe, Balboa Beach, Calif. Much constructive business was taken up at the meeting and many of the delegates present offered suggestions for combating the unemployment problem in the studios. At the request of Herb Aller, who represented Cameraman's Local 659, District No. 2 endorsed a resolution against reissues of pictures, which he blames for a large percentage of unemployment. Another reason for the drop in studio

Season's Greetings

from

M. P. M. O. LOCAL NO. 650

Westchester County, N. Y.

employment was advanced by International Representative Roy Brewer, who stated that the condition was due in a large measure to foreign production, which has cut sharply into American-made pictures.

Other matters taken up at the meeting concerned pensions, arbitration, television, drive-in theatres, and guaranteed employment. Merle Chamberlin, Hollywood Local 165, gave some helpful pointers on the wording of arbitration clauses in contracts.

Among the delegates present at the meeting were George Schaffer, Wallace Crowley, Charlie Vencill, Los Angeles Local 150; Jim Eddy, Walter McCormick,

Hollywood Local 165; Charles Baumgartner, Wm. Romley, J. Cox, Bakersfield Local 215; W. W. Wise, George L. Abrams, San Diego Local 297; Alonzo Bennett, G. A. Lahlum, W. E. Swank, Sr., Long Beach Local 521; Ted Ellsworth, M. J. Caplan, and Martinez, Hollywood Local 705.

- The death of John (Jack) Thomas Peyton, charter member and past president of Local 380, Oklahoma City, came as a shock to his many friends and associates in the industry. He died November 22 at the Will Rogers Veterans Administration Hospital shortly after he suffered a heart attack.

Peyton began his projection career

... An Appreciation

THE history of an organization usually comprises in the main a listing in chronological order of a more or less connected series of events which in sum tell the story of its birth, its first feeble gropings to sustain itself, and its growth and development through the formative years until it attains maturity.

Such an approach is adequate for compiling the record of a purely social organization which is identified with the lighter moments of life; but it would fail utterly to accurately chart the course of an organization which is intimately concerned with the basic elements of life itself—the providing of the means for acquiring food and shelter and clothing, and for insuring that degree of security which can be realized only through the fraternal association of a group banded together to safeguard their livelihoods.

Very definitely, we members of the IA belong in the latter category; and it is eminently fitting—in a sense, obligatory—during this holiday season that we pause and reflect upon the immeasurable contributions by those old-timers whose devotion to an ideal through many wearying years made possible those benefits which flow from our organization today—contributions, let it be said, compounded of unremitting effort, self-denial, privation, hardship in many forms—yes, and sometimes blood.

The history of any labor union may not be truly recorded in the cold impersonal words relating to the passage of time, to statistics or even to those happenings which in retrospect loom through the mists of time as milestones

along the road to progress. No indeed! What needs must be set down are words expressive of those human qualities of heart and hand, of mind and bone and sinew which effected the translation of a dream into a reality—a dream which was to require the passing of many years fraught with bitter experiences before it could be realized.

In a society which today extends an ever-widening recognition to the simple justice and economic soundness of security for those who have grown old in a field of endeavor, the old-time members of the IA are the beneficiaries of a modicum of security, to the expansion of which program the younger members might well give serious thought.

True it is that the world needs not so much to be told as to be reminded, and this truism has application in full-measure to those old-timers who, having fought the good fight, are entitled not only to our deep-seated inner appreciation but also to an outward manifestation of our recognition of and respect for their accomplishments. This we can do by practicing upon every possible occasion those simple little virtues of courtesy and patience which serve so admirably to smooth out the ruts in the road of life. Time passes for we younger members, even as these lines are written and read, and some day all too soon we shall stand in the places of the old-timers.

So as we observe this holiday season, let all pay inward homage as well as give outward expression to the respect and appreciation we owe those old-timers whose magnificent doing wove the gossamer thread of dreams into the rugged and enduring fabric that is our organization today.

Mr. and Mrs. Floyd B. Spencer,
Rochester Local 253, extend to
all their friends in the Alliance
their very best wishes for a

Happy Holiday Season

Greetings

from

LOCAL NO. 488

HARRISBURG

PENNA.

back in 1908 and his reputation as an expert craftsman was known throughout the state. His services were sought by all the leading supply houses, and in 1941 he became associated with the Oklahoma Theatre Supply Company, where he remained until the time of his death. He is survived by his widow, two sons and three daughters.

- Syracuse Local 376 recently sponsored the presentation of the IA Documentary Film for its members and their families at a midnight show which was held at the Regent Theatre. Also shown at the time was the National Carbon 16-mm Technicolor picture "Carbon Arc Projection," which was warmly received by those present. Refreshments rounded out a very interesting and entertaining session.

- The membership of Buffalo Local 233 presented its very popular business agent, Bert Ryde, with an 8-cylinder 1949 Cadillac car in appreciation for services rendered during the past 21 years. Ryde was recently unanimously re-elected to office for an additional four-year term, at the end of which he will have served the Local for 25 consecutive years. Buffalo Stagehands Local No. 10 presented him with a working card in the Local.

- Louis Wutke, member of the Projection Practice Committee, which was formed within the Research Council of

**Season's Greetings
and Good Wishes**

**FROM THE MEMBERSHIP
OF LOCAL NO. 162
San Francisco, Calif.**

Mr. & Mrs. J. E. Biencourt,
San Antonio Local 76, extend
to their many friends in the
Alliance their best wishes for a

*Happy Holiday
Season*

the Academy of Motion Picture Arts and Sciences on the West Coast, would like to get from members of the craft ideas and suggestions on how to improve projection standards. This committee, comprised of top-ranking projectionists, has the endorsement of many of the large projectionist IA Locals on the West Coast. The group is engaged in preparing a report to be released to the industry. Send along your suggestions to Wutke in care of Los Angeles Local 150, 1489 W. Washington Blvd., Los Angeles, Calif.

- H. Paul Shay, Local 289, Elmira, N. Y., and secretary for District No. 10, stopped at IP offices last week for a brief visit. It is always a pleasure to chat

with Paul, so well informed is he on a variety of subjects.

- Notes on the Trades and Labor Congress of Canada meeting held in Victoria, B. C.: Hugh J. Sedgwick, business agent of Hamilton Local 303 and secretary for District No. 11, was elected Fraternal delegate to the AFL convention which was held last month in Cincinnati, Ohio. . . . James Whitebone, secretary-business agent of St. John Local 440, was re-elected vice-president of the Congress. . . . Wm. P. Covert, business agent of Toronto Local 173 and 2nd IA vice-president, was elected chairman of the Credentials Committee. . . . IA President Walsh, who was the Fraternal delegate from the AFL to the Canadian Trades and Labor Congress Convention, impressed the delegates with the creditable manner in which he conducted his duties. . . . Orin Jacobson, Local 175, Tacoma, Wash., and secretary for District No. 1, also attended the sessions.

- The 25-30 Club held its 100th meeting last month at the Preview Theatre on Broadway here in New York where National Carbon's 16-mm picture, "Carbon Arc Projection," was shown to the mem-

Season's Greetings

LOCAL NO. 433

I. A. T. S. E.

Rock Island

Illinois

Greetings and Best Wishes

To All Local Unions In The Alliance

from the

**OFFICERS AND MEMBERS OF
NEW YORK CITY LOCAL NO. 306**



**Greetings and Best Wishes
to our Sister Locals from
LOCAL NO. 461
St. Catharines, Ont.
Canada**

bers. On hand to answer all questions were National's representatives, Paul Reis, A. B. West, Herb Reusch, and Dave Calkin. Morris J. Rotker, president of the Club, recovered sufficiently from his recent illness to preside at the meeting.

Election of officers for 1949 was held at the December 13 meeting and the following were unanimously elected: Cecil R. Wood, *president*; Albert Kay (Jersey City Local 384), *vice-president*; Ben Stern, *financial secretary*; Morris Klapholz, *recording secretary*; Ed Dougherty (Local 384), *sergeant-at-arms*, and John Krulish, *trustee*.

In conjunction with the installation of officers at the scheduled January meeting, the Club will tender a testimonial dinner in honor of P. A. McGuire, International Projector Corp.'s good-will ambassador for many years. Also, a gold honorary membership card will be presented to Larry Davee, sales manager for Century Projector Corp.

- The annual meeting of the New York State Association of Projectionists was held last month in Gloversville, N. Y., with a record-breaking attendance. Marty Bennett and Bill Graham of RCA were



Eddie Miller, IA representative and business agent of Local 279, Houston, Texas, presents gold honorary membership cards to Sewall Meyer (left), attorney for the Local since its inception and for many years attorney for the Texas State Federation of Labor, and to Lucien M. Andler (right), one of the Local's old-time members. Lucien was a familiar and popular figure at many IA conventions which he attended as a delegate from Local 279, and although he was elevated to a judgeship some years ago, he still retains his membership in the Local.

on hand supervising the demonstration of the Brenkert projector; and Paul Reis and A. B. West of National Carbon Co. were in charge of National's Technicolor picture, "Carbon Arc Projection," which aroused much favorable comment from the delegates.

All officers of the Association were re-elected for another two years.

Paramount's first move to install its intermediate Tv system in Canada is reported set for the Famous Players Imperial Theatre in Toronto, which seats 3,373.

IP LETTERS TO THE EDITOR

Skill, Experience Basic Assets

To the Editor of IP:

I have read and re-read the editorial (Monthly Chat) in the November, 1948 issue of IP. I think the magazine is to be complimented on the sane and vigorous way in which it has handled the growing use of safety-stock film for professional projection.

The issue, in fact, seems to me to be one likely to be thoroughly helpful to all progressive projectionists' unions and their membership.

Projectionists have always had one great asset. As professionals, it was their job to see that the audience secured a bright, sharp, steady and satisfying picture on the theatre screen. The vast majority of projectionists have done this, year after year. Their skill and attention on the job are their real assets.

Nitrate stock has been hazardous—and projectionists have been injured or even lost their lives in film fires in the projection room. The elimination of this hazard is, in itself, a human advantage to the projectionists, and to their unions.

'The Proof of the Pudding . . .'

If safety-stock film behaves as well as nitrate stock, when all concerned know how to use it, one danger to which professional projectionists have been exposed will be eliminated. And the only way of finding whether safety stock is satisfactory for professional projection is actually to try it out.

But regardless of what sort of stock is used for film, the main and important assets of the professional projectionists will still be skill and experience—and on these the projectionist can safely rest his case.

Accordingly, I again want to congratulate IP for a thoughtful and outstanding editorial on this subject, and to express my belief that it will be of help to the projectionists and their unions.

DR. ALFRED N. GOLDSMITH
Consulting Engineer, New York City
Honorary Member, IA Local 306

Unique Types of Film Runners

To the Editor of IP:

I read with great interest the article on film damage to release prints in your October issue. The Projection Department of Denham Studios here has been for a long time now experimenting with various types of runners in the projector in an effort to prevent the pickup of extraneous matter on "green" prints.

These types include runners made from boxwood teak and mahogany.

Up to the present time, however, we have found that by having the original runners highly chromed, while not stopping the pickup altogether, has sharply reduced this accumulation of foreign matter. The projectors are Simplex E-7's.

Studio Uses Plywood Runners

As a point of interest, our sister company, Denham Laboratories, uses runners made of plywood impregnated with Bakelite: after running "green" prints right off the printer they find no trace of pickup whatsoever.

The practical, down-to-earth articles and opinions expressed in IP are always eagerly anticipated here.

ERIC HOLMES
Denham Studios, Uxbridge, England

Emery Boards For Scraping Film

To the Editor of IP:

Relative to the new acetate film, here is a gimmick that may or may not be new. We have discarded scrapers, razor blades and such for removing the emulsion from the film base preparatory to making a splice.

We get a ten-cent box of emery boards, break them into four pieces and rub it over the emulsion layer three or four times. This removes the emulsion evenly and does not tear the sprocket holes. We go just far enough under the emulsion to roughen the film base. We get better splices with this than with any scraper that has yet come to our attention.

I just don't savvy the "beef" anent the splicing of the new safety film. Our formula for perfect results is simple: emery stick and Film Weld cement—and we never have a bit of trouble.

E. P. LEHNHOFF
Secretary, Local 548,
Greenville-Paris, Texas

Season's Greetings

from

CLAYTON PRODUCTS CO.
3145 Tibbett Avenue
New York 63, N. Y.

Standby Emergency Power Units

ONE evening last August some 400 people were enjoying a movie at the Roxy Theatre, Slippery Rock, Penna. Outside, the brightly illuminated marquee and the myriad lights of the little town indicated that everything was normal. Then, without warning, the whole town went dark! Somewhere, lightning had struck a transformer and the resulting line failure interrupted electric service to the entire community.

But while the citizens of the town groped around for candles, kerosene lamps or other means of lighting, everything at the Roxy Theatre went along as usual. There was only a five-second interruption of the movie, then the show continued. For one hour and forty-five minutes the Roxy front was an island of dazzling light in a sea of darkness.

Most important, inside the Roxy the show continued on to its end and not a single refund was made.

This happening is typical of those forward-looking theatre operators who smartly anticipate such power failures and who provide against them by installing standby emergency power units.

The Federal Power Commission reported recently that the United States is burning electricity at the greatest rate

in history—approximately 25% above the wartime peak. And this condition is aggravated, according to the Commission, by a scarcity of large generating equipment and the inability of manufacturers to produce it fast enough to keep up with the demand.

Even this does not tell the entire story. Violent weather threatens to increase the difficulty, if the record of the past few months is any indication. From the Canadian border to the Gulf of Mexico, storms, floods, sleet and disasters of every kind will boost the "normal" rate of power breakdowns to record proportions. Despite the efforts of power companies to keep the lines open, thousands of power failures are due to occur during the coming year.

The nation-wide attention that has been focussed on the problem of power failures or shortages has caught the attention of at least one manufacturer of standby electric power plants. D. W. Onan and Sons, Inc., Minneapolis, Minn., is turning out modern standby plants on a mass-production line to cut costs and bring prices down, at the same time making more emergency plants available for the crisis.

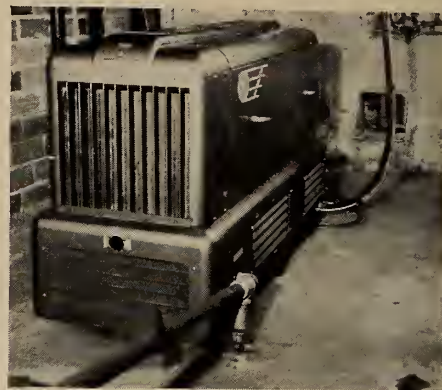
Frequent Standby Unit Use

"We have used our Onan standby plant quite frequently in the last three months due to a very low power condition resulting from an acute power shortage in this section," Edgar Shaffer, owner of the Roxy, reported recently. "On a number of occasions our voltage has been under 100 volts on the line, which is too low to operate our theatre without considerable difficulty. It has been most gratifying to be able to 'push the button' and have a plentiful supply of light and power at one's command."

Theatres use motor generators or rectifiers to produce the current for their arcs. Generally, this is obtained from 3-phase, 230-volts, 60-cycle a-c.

When motor-generators are used, it is necessary to carefully consider the HP rating of the motor before selecting the standby unit. These motors will run from 3-horsepower to a high as 40. It is impractical in most cases to operate a large motor from a standby unit. (There must be a reserve capacity on twice the KW used by the motor in order to insure enough current for the starting of the motor.) Perhaps the top limit would be 10 or 15 HP. This would require a generator set of 25 KW.

Where copper-oxide selenium rectifiers are to be used to produce the d-c current for the arcs, the capacity of the standby



Type EI-10 Onan emergency power supply unit for theatres of under 1000 seats.

unit may be much more in line with the actual current used. By determining the current used in the arcs and adding a safety factor of 1 or 2 KW, a safe and satisfactory load may be estimated.

In nearly every case the voltage used for the arcs (powering the motor-generator rectifiers) will be 3-phase, 230-volts. It is necessary to have single-phase for the other requirements of the theatre such as lights, motors for projection, etc. These require 115-volt, single-phase. Therefore, in order to take care of both power requirements the standby unit should be 120/208 volt, 3-phase, the 120 volts for single-phase equipment, and the 208 volt for the 3-phase equipment.

In applications where most of the load is made up of inductive load such as motors, transformers, etc., it is best to obtain the voltage-regulator type of generator. This is obtainable in the larger units from 15 KW to 35 KW. Voltage-regulator generators work better than saturated field generators on inductive type loads, since the voltage may be adjusted up when it drops due to the power factor encountered with inductive loads.

Greetings from

**STAGE EMPLOYES
LOCAL NO. 366**

**Westchester County
New York**

Greetings . . .

LOCAL NO. 279-A

**HOUSTON
TEXAS**

Best Wishes

from

LOCAL NO. 434

Peoria, Ill.

Greetings from

MPMO LOCAL NO. 253

Rochester New York

Season's Greetings

from the officers and members of

LOCAL NO. 224-A

**STAGE EMPLOYEES & MOTION
PICTURE MACHINE OPERATORS**

Washington, D. C.

SOUND SYSTEM ELEMENTS

(Continued from page 8)

with a railroad which offers two alternative routes to a city, one a direct route and the other a roundabout excursion passing through a number of obscure whistle stops. Most commuters, in a hurry to reach their destination, will join the main current of traffic on the express trains, but a few will choose the circuitous route in order to enjoy the scenery.

More complex circuits, such as many of those found in amplifiers, contain several series and parallel branches. Confusion is avoided when analyzing the wiring of amplifiers by tracing out the separate, comparatively simple circuits, and studying each one by itself, ignoring the others until each is examined in its turn.

Current sources, such as dry cells, may, like the current-consuming devices in a circuit, be connected in series or parallel. When a group of cells is connected in series (+terminal to -terminal), the total voltage is the sum of the voltages of the individual cells. When connected in parallel (+terminal to +terminal, and -terminal to -terminal), the total voltage is that of one cell alone, but the available current is greater.

Resistance to Current Flow

As we have seen, the various devices or appliances in an electric circuit each produces a voltage-drop, and that the drop of potential may be measured by connecting a voltmeter to the terminals of the device while current is flowing through it. The voltage-drop is caused by the *resistance* that the device offers to the flow of electric current. It will be seen that the greater the resistance of a device, the greater the voltage-drop across its terminals.

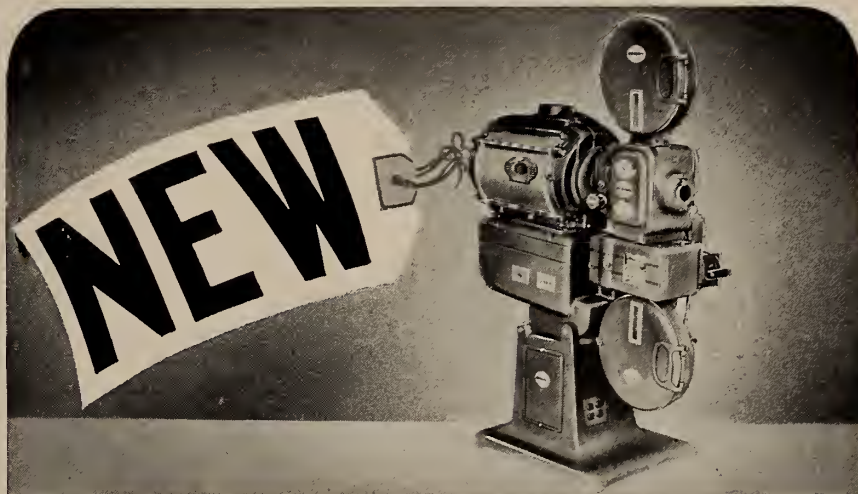
The resistance which a conducting substance offers to the flow of current depends on the nature of the substance, its length, its cross-sectional area, and its temperature. Copper, for example, is a better conductor than iron. A mile of copper wire offers higher resistance than a yard of the same wire. A thin copper wire offers higher resistance than a thick one. Further, a hot copper wire offers higher resistance to current than a cold one! (Higher resistance with increase of temperature is the rule with metals. Carbon, a non-metal, offers lower resistance at higher temperatures.)

The unit of resistance is the *ohm*. A 10-ohm resistor, for example, offers twice the resistance of a 5-ohm resistor. When we deal with resistors having resistances

of hundreds of thousands of ohms, the *megohm*, equal to one million ohms, is a convenient unit.

The insertion of a resistor into a circuit not only reduces the pressure of the current (voltage) but also limits the intensity of current (amperage) which a given potential is able to force through the circuit. The important relationship between the electromotive force, current, and resistance in a circuit was first formulated by G. S. Ohm in the "law" that bears his name.

Ohm's law states: "The current (*amperes*) in a circuit varies directly as the e.m.f. (*volts*) and inversely as the resistance (*ohms*). In other words, the amperes increase with an increase of volts,



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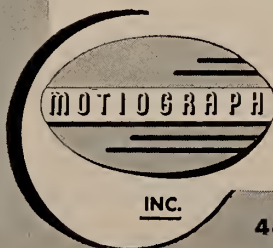
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Moving Picture Machine Operators

but decrease with an increase in ohms. The following three formulas are mathematical statements of Ohm's law.

$$\text{Ohms} = \frac{\text{Volts}}{\text{Amperes}}, \text{ or } R = \frac{E}{I}$$

$$\text{Amperes} = \frac{\text{Volts}}{\text{Ohms}}, \text{ or } I = \frac{E}{R}$$

$$\text{Volts} = \text{Amperes} \times \text{Ohms}, \text{ or } E = IR$$

Let us see how these formulas are used. Suppose we wish to light an exciter from a 110-volt d-c line. The imprint on the bulb tells us that the exciter requires 5 amps at 10 volts. Such a bulb would burn out instantly if it were connected directly to a 110-volt line. We must, accordingly, connect a resistor in series with the bulb to reduce the current. Now the problem is: how many ohms of resistance must the resistor offer to the flow of current in order to supply exactly 10 volts to the lamp?

1. *Find voltage-drop first.* Because the supply voltage is 110 volts, and because the exciter requires only 10 volts, the resistor we use must provide a drop of:

$$110 - 10 = 100 \text{ volts.}$$

2. *Then use the formula for ohms.* The voltage to use in the formula is the drop of 100 volts. The amperage is the

number of amperes drawn by the lamp — 5 amps.

$$R = \frac{100}{5} = 20 \text{ ohms.}$$

Check. Let us check our calculation to prove that 20 ohms is the correct value of resistance to use. The resistance of the exciter is:

$$R = \frac{10}{5} = 2 \text{ ohms,}$$

hence a 20-ohm, voltage-dropping resistor will supply the exciter with a current of:

$$I = \frac{110}{20 + 2} = 5 \text{ amperes}$$

at a voltage of:

$$E = 5 \times 2 = 10 \text{ volts.}$$

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LOCAL NO. 249
M. P. M. O.
DALLAS, TEXAS

Season's Greetings
LOCAL NO. 314
Schenectady, New York

Now a word of caution. Every resistance to the flow of current causes some of the electric power to be transformed into heat. If the current-carrying capacity of our 20-ohm resistor be too small, the resistor will overheat and burn up. How can we calculate the current-carrying capacity required?

Previously we gave the formula for electrical power, namely, $P = EI$. It is the electrical power (watts) consumed or dissipated by a resistance that is changed into heat. Our Ohm's law formula for volts gives the value of E as $I \text{ times } R$, and if we substitute IR for E in the "power formula" we obtain:

$$P = IRI \text{ or, better, } P = I^2R.$$

We now have a formula which gives watts when amperes and ohms are known.

Our resistor is rated at 20 ohms. How many amperes does it pass when the exciter is burning? Five amperes, because the amperage flowing in a series circuit is the same in all parts of the circuit, as previously stated. Now, then, how many watts are dissipated in the 20-ohm resistor? By our new power formula:

$$P = 5 \times 5 \times 20 = 500 \text{ watts.}$$

It is customary to have a safety margin of approximately 100%, so we shall have to use a 20-ohm resistor of about 1000 watts capacity. Needless to say, a resistor of these specifications is a rather heavy piece of apparatus.

It sometimes happens that we do not have at hand the exact type of resistor we need to make temporary repairs. It is an advantage, therefore, to know how to connect several resistors together to obtain a net resistance of the required ohmic value. Following are the formulas that enable us to calculate the resultant resistance of resistors in series and parallel.

Series-connected resistors:

$$R = r_1 + r_2 + r_3 + \dots$$

Parallel-connected resistors:

$$R = \frac{1}{\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} + \dots}$$

In these formulas R is the resultant



Mr. David Weinstock,
*President,
Raybond Theatres Corp.,
and Chairman of the Board,
Independent Theatre Owners
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THE SERVICE ORGANIZATION OF
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resistance in ohms, while r_1 , r_2 , etc., are the individual ohmic resistances. For two resistors in series we have:

$$R = r_1 + r_2$$

and for two resistors in parallel we have:

$$R = \frac{1}{\frac{1}{r_1} + \frac{1}{r_2}}, \text{ or } R = \frac{r_1 r_2}{r_1 + r_2}$$

Voltage Dividers

Resistors are frequently arranged as *voltage dividers* in amplifiers and amplifier power units. In its simplest form a voltage divider is a coil of resistance wire having one or more taps along the length of the coil.

Season's Greetings

To Every Projectionist

DeVRY CORPORATION

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HEROD JIMERSON—Owner-Manager, Liberty Theatre, North Little Rock, Arkansas—writes:

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Greetings

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TEXAS

As an illustration, suppose that the high-voltage output of a power unit we are using is 300 volts d-c. Also suppose that some of the tubes in our amplifier must be supplied with a plate current of 300 volts, and that the plates of other tubes require only 100 volts.

If we wish we may connect the 300-volt output leads directly to the plates of the tubes requiring 300 volts, and we may arrange a parallel circuit with a dropping resistor to supply 100 volts to the plates of the other tubes. It is simpler, however, to draw our plate voltages from the taps of a voltage divider. Here is how the voltage-dividing hook-up works:

Assume a wire-wound resistor of proper resistance value connected across the 300-volt power unit output leads. The electrical pressure across the outside terminals of the resistor is, obviously, the full 300 volts. In other words, the voltage-drop across the outside terminals of the resistor is 300 volts.

Now suppose that the resistor is tapped at a point one-third of the way down the length of the resistor. Since the voltage-drop across the entire resistor is 300 volts, the drop across one-third of its

length is 1/3 of 300, or 100 volts. We therefore supply our 300-volt plates from the end terminals of the voltage divider (in parallel with the output terminals of the power supply), and we supply our 100-volt plates from the divider tap and the end terminal nearest the tap.

Voltage dividers work satisfactorily only when the current drain from any tap or set of taps is not excessive. The resistance coil itself consumes current all the time, hence constitutes a *load* of so many ohms. The matter of load is extremely important in the circuits of the amplifier proper.

A rheostat is merely a variable resistor,



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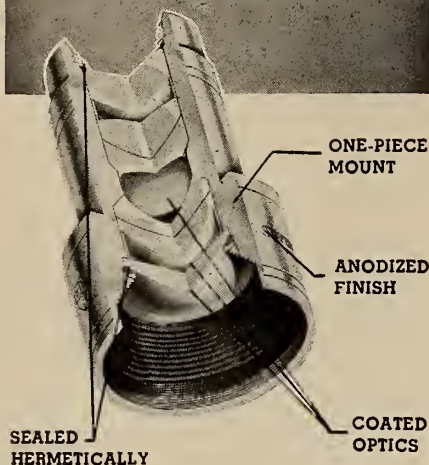
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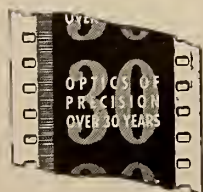
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and a potentiometer is nothing but a variable voltage divider, so it is unnecessary to describe these pieces of apparatus in detail. Potentiometers are commonly used as volume controls in amplifiers. They have the advantage of imposing a constant load upon the input or plate circuit of a "stage" of amplification (insuring constant impedance) while permitting us to vary the magnitude of the voltage "swing" in the grid circuit of the subsequent stage.

But to say more here about load, impedance, grid swing, *et al* would be to anticipate our story. We must first examine the peculiar characteristics of current that periodically alternates in polarity, or direction of flow.

[To be Continued]

20 YEARS OF SERVICING

(Continued from page 23)

prized parts which were once considered junk. Frequently, when we found the stock bin empty and desperate need arising, distress signals were broadcast to the inspectors and 250 men flushed the needed parts out of dusty corners, second-hand stores, and even pawnshops.

Many unusual means were adopted for getting the last useful hour of operation out of each and every part of the sound systems. Testing and repair procedures were set up for vacuum tubes to conserve these parts so vital to the armed forces. Many electrical and mechanical parts which had formerly been discarded when they became defective were rehabilitated.

To conserve copper, we devised a

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LOCAL NO. 165

Hollywood

Calif.

unique method of repairing bellows assemblies, since each contains 14 ounces of strategic copper and there were several thousand used in theatres. Altec engineers served as the collection agency for copper drippings from arc lamp carbons, and many pounds of this vital material were collected and turned over to salvage depots.

One of our most difficult problems was that of getting sufficient gasoline for the field engineers to provide rapid transportation to theatres in case of emergency. The frequently changing regulations and their non-uniform interpretation by the local rationing boards made it difficult, in some cases impossible, to secure gasoline. Here, again, we finally

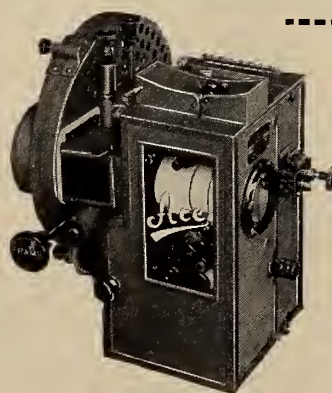
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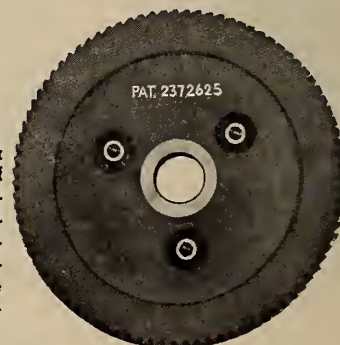
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succeeded in having a special regulation issued covering this situation.

Space is not available for further details of the battle to keep the thousands of theatres operating through these troubled days, but we are proud to report that there was not a single instance of a theatre serviced by us which shut down because of non-availability of replacement equipment.

A Look Into the Future

Now let us try to see what the future holds. The most reliable crystal ball in this case is a mirror which shows the future as an extension of the past. The pattern will not change radically, and step-by-step improvements will continue to reach the theatre. These improvements will result in greater complexity in the technical sense than those of the past.

What will be the nature of the new developments? A specific answer to this

our part will be required to ensure that no theatre will be scooped by its competitor.

Procedure for New Developments

The following steps illustrate the manner in which a complete service organization proceeds as new developments are brought to the point where they are ready for the theatre:

(a) Close liaison with and participation in the activities in Hollywood and those of the equipment manufacturers

allow us to anticipate and prepare for the development.

(b) A competent headquarters engineering staff appraises the approaching development in relation to the individual problems presented by all the numerous specific types of sound reproducing equipment, and prepares the required technical information for the field, adaptation details where required, and the necessary tools and test methods.

(c) The field organization copes with

Season's Greetings

**MPMO LOCAL NO. 597
WACO TEXAS**

is not available to us, but we know that a great deal of competent engineering attention is being given to such things as control track, automatic volume control, stereophonic sight and sound, television, panoramic or wide-angle sound origin, extended range, and new color film which will require modification of reproducing equipment.

Means of standardizing auditorium loudness—to ensure that each picture is reproduced at the volume intended by the recording director—must be developed to ensure the greatest listening com-

Greetings from

**LOCAL NO. 224
Washington, D. C.**

fort and to bring out the full quality recorded in the picture.

Until the details of any of these developments crystallize we cannot foretell today precisely the action that they will require on the part of our service organization. However, it is likely that improvements will come more or less abruptly and that large-scale efforts on



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the actual application of the innovation in each particular theatre.

(d) Following the exciting period during which the innovation is introduced, the service inspectors guard the equipment performance to ensure that the new standard of quality is maintained and all new components are watched on a nation-wide basis to correct at the earliest possible time frailties which may develop in the first few cases during operation.

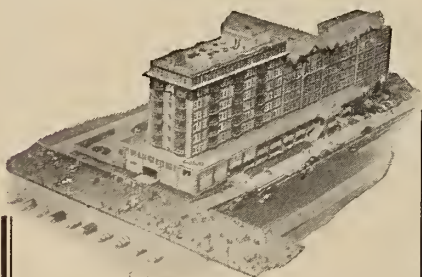
Obviously, the individual or small local



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service group cannot possibly render the complete and comprehensive service that is required by the exhibitor. Contact with the producer and equipment suppliers must be completely lacking; and even a competent and informed engineering department cannot provide the essential firm foundation for such activities, or provide them with up-to-the-minute information, instructions, tools, and techniques. Equipment troubles must be experienced in a large percentage of the theatres involved before remedial measures can be developed.

With the protection accorded by a complete organization, the motion picture exhibitor may welcome approaching evolution with confidence and without apprehension. Thousands of exhibitors and projectionists will attest to the necessity to them of such a complete organization.

New RCA Drive-In Systems

A new line of drive-in theatre sound systems—the "High Power" and the "Super Power"—has been announced by RCA, marking the first manufacturer to offer drive-in systems covering the extensive output range of 70 to 1000 watts. Uniquely, both systems are so designed as to permit starting out with a small power output and subse-

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To All I. A. T. S. E. Locals
PROJECTIONISTS LOCAL NO. 521
Long Beach California

Season's Greetings
LOCAL NO. 414
I. A. T. S. E.
Wichita Kansas

Greetings!
LOCAL NO. 303
I. A. T. S. E.
Hamilton, Ont.
Canada

quently to build up to a greater output by adding amplifiers.

These two new series equipments add eleven different systems to RCA's drive-in line. RCA will continue to make available the de luxe PG-251 sound system.

Par's 9-Months' Net \$20 Million

Earnings of Paramount Pictures Corp. for the nine months ending Oct. 2 last were \$20,015,000, with profit estimated at about \$2.93 per share of common stock, after provision for all taxes. This figure compares with the \$25,512,000 earnings for the first three quarters of 1947, equal to \$3.63 per common share.

Noteworthy is the exclusion from the 1948 figures of all earnings of foreign subsidiaries except to the extent that dividends have been received in dollars.



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Eastman, Technicolor Sued by Keller-Dorian: \$300 Million

Two suits, filed Nov. 22, seek damages totalling \$300 million, one against Eastman Kodak Co. alone and the other naming Kodak as co-defendant with Technicolor, Inc., and Technicolor Motion Picture Corp. The suits allege breaches by Kodak of licensing agreements in 1927 and 1930 which permitted Kodak to use the so-called Keller-Dorian process for making color films, and unlawful arrangements with the Technicolor companies in violation of the anti-trust laws.

"In my opinion, these suits are without justification and the claim for damages is absurd," said Thomas E. Hargrave, president of Eastman Kodak Co. "Since the early days of motion pictures, the Eastman Co. has continuously devoted funds, manpower and facilities to the investigation and development of processes that have offered the possibility of improving color photography.

Large Expenditures on K-D Process

"One was the Keller-Dorian process, under which Eastman acquired a license more than 20 years ago. This process used what is called 'lenticulated' film. Large sums were spent on the process in research and development. Kodak's first color motion picture film for the amateur involved the use of the Keller-Dorian process.

"After a fair trial on the market, however, it was found that other processes enabled us to meet commercial requirements more easily and economically. Accordingly, use of the process for the amateur market was discontinued a good many years ago.

"Nevertheless, Kodak has continued experimental work with the purpose of eventually making lenticulated film commercially useful in the field of professional color motion pictures. As yet, the company has not arrived at results which, in its opinion, warrant the recommendation of such film for widespread use for professional motion pictures. This circumstance has no relation whatsoever to any agreements between Eastman and Technicolor.

Kodak Aided, Not Hindered, Process

"Kodak has never prevented others from working in the lenticular film field but, on the contrary, has not only supplied the special film required for the purpose but has also furnished considerable technical advice and assistance.

"At least two American motion picture producers and a large European manufacturer have done a great deal of work and experimentation in this field over a considerable period of time. So far as we are

aware, none of these efforts has yet met with commercial success.

A similar denial of any violation of the anti-trust laws was made by Dr. Herbert Kalmus, president of Technicolor, who pointed out that his company had never had any contract with the K-D people.

W. E. Direct-Positive Recording

Extensive use in the television and 16-mm fields is predicted for a new method of sound-film recording announced by the ERP unit of Western Electric. 16-mm results comparable to 35-mm theatre sound are achieved by using the basic techniques of variable density recording with the light valve and emitting the customary negative step in processing.

In making a recording, standard light valves are used. The usual direct current bias for noise reduction is not applied. Instead a high-frequency a-c bias of the order of 24 kilocycles is superimposed on the light valve.

Improved Output Level. Less Distortion

The h-f current makes possible a "toe" recording, or one of unusually light exposure. The result, compared to previous methods, shows distinct improvement in output level, distortion content, and in the elimination of printer loss and distortion—the direct positive method requiring no printing step. Improved frequency response, reduced flutter content, and lowered costs are added advantages of the new method.

Needed to make these recordings, in addition to recent W. E. recording equipment, is but a simple oscillator to provide the a-c bias. The recordings are used with pictures in the standard manner and no change is required in the sound projectors on which the film is used.

Greetings from NEW YORK STATE ASSOCIATION of MOTION PICTURE PROJECTIONISTS

Charles F. Wheeler, Secretary



CHAS. GREIME—General Manager of six Greime and Fasken Theatres in Wenatchee, Omak and Holden, Washington—says:

"We have used RCA Service in our various theatres for the past 18 years and consider this service one of our greatest assets."

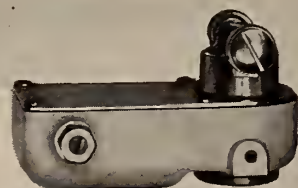
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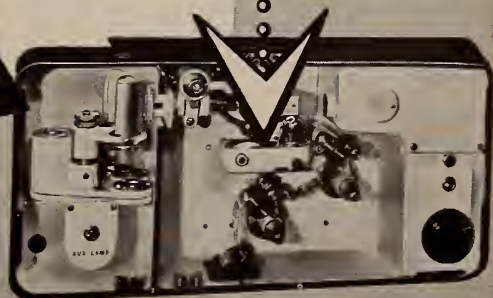
The Award-winning Hydro Flutter Suppressor as used in the new Century sound reproducer.

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Holiday Greetings

to the

OFFICIAL FAMILY

and to

All Local Unions of the IA

LOCAL NO. 355

Sioux City, Iowa

FALLACY OF THE 'PERSISTENCE OF VISION' THEORY

(Continued from page 18)

motion has been made, one can close the eyes and anticipate where the moving figure will be some time later: this can be attributed to the memory or persistence of the brain picture.

True perception of motion depends mainly on muscular action, aided in motion picture projection by persistence phenomena. The latter is not the least important of the nine co-ordinated functions which contribute to human vision.

W. WATSON

The interest of Mr. Sewell's remarks is not in their correctness, but in the fact that they had to be made. That they are correct can be seen either by appeal to authority, the physio-psychologists, or far better by thinking about everyday phenomena that everyone sees and very few notice.

For instance, traffic lights when they are changing. Obviously persistence of vision plays no part in the apparent motion here, any more than it does in the low-frequency animation used in sky-signs.

(Mr. Watson holds that the motion is real, and that the lamps in the traffic light actually slide up and down. Also, presumably, that the drawings in an animated cartoon start running around on the negative as soon as they are developed. They don't.)

Psychology, Physiology of Vision

The photographer and the cinematographer are fundamentally concerned with the psychology and physiology of vision, and an industry involving millions of pounds is tied up with it. Yet few have any idea of what has been done in this field, and many do not know the field exists.

Much has to be done in understanding the synthesis of movement, but the empirical laws of the beta movement (on which the motion picture illusion mainly depends) have been known for some decades. Application within the ani-

mated cartoon field, alone, would have saved many costly experiments and re-takes.

To some extent, ignorance of fundamental research can be forgiven. What cannot be forgiven is the parrotwise repetition of fallacies that are disproved by everyday experience. Scientific thought is not confined to, or universal with, scientific workers, and scientific laws are not restricted to laboratory hours, nor do they perform only for the benefit of chromium-plated apparatus.

R. A. FAIRTHORNE

Revised 'National' Carbon Book

National Carbon Co. is now distributing the fourth edition of the "National" Projector Carbon Handbook. The third edition was published in 1935. Charts, tables, photographs and drawings are included. The handbook contains chapters

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from

LOCAL NO. 348

Vancouver, B. C.

on such subjects as the physics and measurement of light, progress in projection lighting, the various types of high- and low-intensity arcs, and carbon arc projection for 16-mm film.

In addition, the handbook provides tips on adjustment and alignment of projector carbons, the amperage and voltage requirements of each size and type, operating precautions and the proper care of electrical equipment and optical systems.

Graphical Exposition of Feedback in Amplifiers

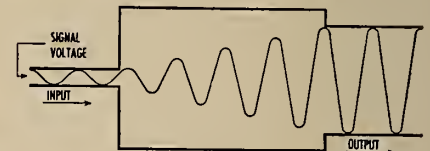
Like many other major advances in electronics, the development of stabilized (negative) feedback was a direct outgrowth of telephone progress. To produce telephone repeaters with the necessary gain stability and low distortion, H. S. Black of Bell Telephone Labs took a sample voltage of the amplifier output and fed it back into the amplifier in *opposing* phase. Before-and-after effects are shown in simplified form in the accompanying sketches.

The *signal* portion of feedback subtracts from the input signal. (In practice, input receives additional amplification to maintain original output voltage.)

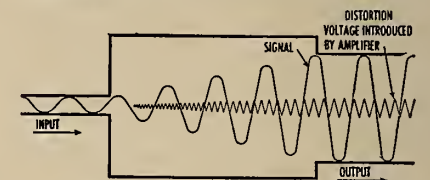
Distortion Cancels Itself Out

The *distortion* portion, encountering no opposing voltage in the input, is amplified in opposition to the distortion voltage arising in the amplifier. Hence distortion voltage largely cancels itself out—output corresponds closely to input. Noise originating in the amplifier is reduced in a similar way.

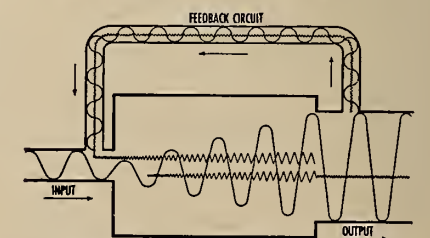
The relations of input, output and gain are shown in Table A. As shown, the gain of the amplifier stages incorporating feedback can drop 50 percent, with a drop in *over-all* gain of only 1 percent. Hence *gain remains virtually constant* regardless of changes in power supply or performance of components.



(A) IDEAL AMPLIFIER existing only in theory. Output exactly duplicates input, except for amplification.



(B) AMPLIFIER WITHOUT FEEDBACK. Signal suffers distortion, shown as separate a-c voltage accompanying output signal.



(C) AMPLIFIER WITH STABILIZED FEEDBACK. Sample voltage, containing signal and distortion in same ratio as in output, is fed back in opposing phase to input. Distortion portion is amplified in opposition to distortion arising in amplifier.

TABLE A. How Feedback Stabilizes Gain

Voltage Gain Without Feedback	Total Input	Feedback Voltage (negative)	Net Input (less feedback)	Output	Overall Gain
1000	10.1	10	.1	100	9.9
500	10.2	10	.2	100	9.8

Free Da-Lite Screen Test Sample

Free test samples of their Crystal-Beaded screen is Da-Lite Screen Co.'s offer to projectionists as a means of direct comparison with the screen surface now being used. Da-Lite believes that such a test will demonstrate the superiority of their product as a surface that gives maximum brilliance plus wide-angle reflection and long-wearing quality.

The sample swatch of screen material is adequate to permit a fair comparison. On the cover is an interesting chart that describes the Da-Lite surface and gives instructions for testing the sample. Address requests to Da-Lite at 2711 N. Pulaski Road, Chicago, 39.

Jackson Reel-End Signal and Non-Intermittent Projector

The Jackson Reel-End Signal, used extensively throughout Canada for the past year, is now made in the U. S. by American Theatre Supply Co., 1504 14th St., Seattle 22, Washington, and will be available through all U. S. supply dealers. The inventor, J. G. Jackson, a practical projectionist for more than 20 years, is now at the Capitol Theatre in Port Alberni, Vancouver Island, B. C.

Based on the pendulum principle, the Jackson Signal will swing only at a single predetermined speed of the reel spindle. When the pendulum swings back and forth, a small hammer suspended inside the ball comes in contact with the rim of the gong and gives a soft-toned warning of 15 to 20 seconds duration. As the shaft speed increases beyond the tuned frequency of the pendulum, the sound stops automatically.

The Signal bracket will fit any standard make of projector, requiring only $\frac{3}{8}$ inch thread on the end of the reel shaft. Timing of the signal is accomplished by the adjustment of a small counterbalance on the top end of the pendulum shaft. For reels with 5-inch hub, the weight is set near the top to insure ringing of the bell from one to one-and-one half minutes before the reel end; for 4-inch reel hubs the weight is set near the base of the shaft.

Non-Intermittent Optical Projector

Jackson is also the inventor of a non-intermittent, optical, continuous projector which, utilizing no shutter, has excited widespread attention in projection circles. At present there is available only a handmade model which, built only to prove the inventor's theory, will be supplanted within six months by a precision model for which proper tools will be provided. Several leading projector manufacturers have expressed keen interest in the unit.

New RCA Tv Image Magnifier

Tv pictures received on seven- or ten-inch Tv picture tubes can be enlarged to the approximate size of those produced on a 15-inch picture tube, through the use of a magnifier developed by RCA. When in use, the magnifier is set up about seven inches in front of the Tv picture screen, using two metal supports supplied with it. When made necessary by an elevated position of the receiver, the lens may be suspended from the ceiling and securely anchored in place by tie-wires.

One of the newest applications of plastics in the optical field, the picture magnifier is a transparent Plexiglas lens filled with a clear oil having the same optical properties as the plastic material, a combination that produces a true optical lens.

Emergency 'Exciter' Operation

On a recent trouble call with a complaint of lowering exciter brilliance on the No. 2 machine, we found the rectifier element on the PK-22A2 power-unit to be defective. The adjusting line

resistor had been previously set up to give the maximum output which at that time measured only 9 volts at the exciter lamp. This trouble call was made on a Saturday evening, thus the problem of correcting this low-voltage condition even temporarily was imperative.

The first idea was to secure a 10-volt a.c. transformer from the Dallas office and install a 5-ampere lamp in each machine, but during the time required to obtain this transformer and install it there was danger of the defective unit failing completely.

The thought occurred that the exciter lamps could be series-connected and operated from the No. 1 power unit. This was done by removing the d.c. leads from the plug of the defective unit and connecting them in series with the leads to the other unit.

With no adjustments in the line resistor, 17 volts was measured at each exciter lamp socket. This gave adequate system gain after the photocell potentiometers were balanced for equal machine output. The system was operated in this manner for a period of six weeks and no further trouble was experienced.

—E. D. GAW, ALTEC.

Ampro 'Imperial' Price Slashed

Effective Nov. 1, the retail sales price of the Ampro "Imperial" 16-mm silent projector has been subjected to a drastic reduction from \$276 to \$199.50, without case. Ampro promises that there will be absolutely no change in the quality of this projector.

Why Lenses Are Made With More Than One Type Glass

"White light" is actually composed of radiation in a number of different colors, each of a distinctive wave-length. When passed through a refracting surface, such as that of a lens or prism, the rays of different colors are bent to a varying extent. Thus, in Fig. 1 (A) the red light, of longer wave-length, is refracted to a lesser degree than the blue light. This phenomenon, called "dispersion," is the cause of color fringes in an image formed by an uncorrected lens.

To correct this color aberration the lens designer employs an achromatic lens such as is shown in Fig. 1 (B). The lens comprises two elements, each of a

Season's Greetings

LOCAL NO. 327-A

Cincinnati

Ohio

U. S. Average Movie Admission 50½c

The national average price of an adult evening admission to a movie theatre was 50½ cents, according to a recent survey by Audience Research, Inc. The survey covered 150 cities and included first-run, subsequent and drive-in theatres, as well as local and federal taxes.

Marked differences were noted for Eastern and Western states and also for small cities and towns. From March to August this year prices rose 1-1/3 cents in the East, while declining 2½ cents in the West.

PERSONNEL

REEVE O. STROCK, Recording Manager of the Westrex Corp., has returned to New York after five months in Europe, during which time he visited France, Switzerland, and the Low Countries, spending the bulk of his stay in England.

DR. RAYMOND L. GARMAN, director of research of General Precision Laboratory, Inc., was presented the President's Certificate of

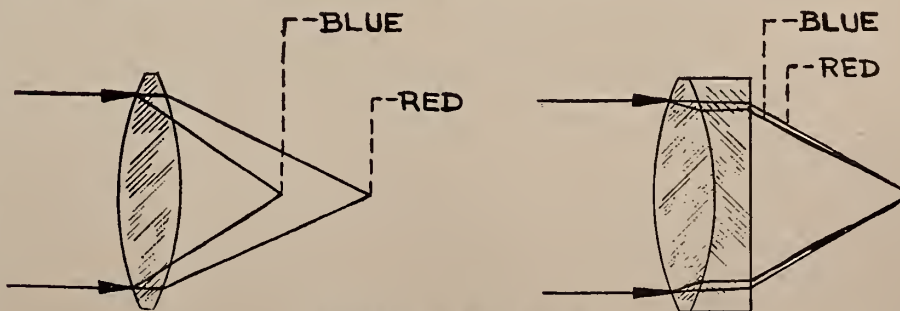


FIGURE 1. A (left); B (right).

Holiday Greetings

LOCAL NO. 510

I. A. T. S. E.

Fargo, N. Dak.

Merit for his services in the wartime office of Scientific Research and Development. Since the termination of his wartime services, Dr. Garman has concentrated his efforts on large-screen theatre television and precision electronic instruments.

JOHN J. DOSTEL has been appointed field sales manager for RCA 16-mm sound-film projectors. DOSTEL formerly was branch manager in Hartford, Conn., for Sound Scriber Corp.

DR. SAMUEL E. SHEPPARD, widely known for his research on the sensitivity of photographic materials, died in Rochester, N. Y., recently. He has been in retirement since January of this year after 35 years with Kodak Research Laboratories. He was the author of some 250 scientific papers and various books, several of which are classics in the photographic art.

ELMER H. BENEKE, active in RCA's 16-mm sound-film projector sales since 1946, has been appointed regional 16-mm sales representative for the Chicago area.

DR. VLADIMIR ZWORYKIN, vice-president and Technical Consultant of RCA Laboratories, has received the Chevalier Cross of

the French Legion of Honor for his outstanding contributions in the field of television. The award coincided with the 25th anniversary of Dr. Zworykin's invention of the Iconoscope, Tv's first electronic "eye."

HARRY A. MONSON has resigned as vice-president and general sales manager for Ampro Corp., of Chicago, with which firm he has been connected for 23 years. He will become associated with his father, A. MONSON, founder and former president of Ampro, in conducting Senior-Sound, Inc., 221 East Cullerton St., Chicago, which has developed a complete line of tape recorders.

T. E. SHEA has been elected president and a director of Teletype Corp., subsidiary of Western Electric. SHEA brings to his new assignment 28 years of varied experience with W. E., Bell Telephone Labs and Electrical Research Products, having been vice-president of the latter firm in charge of acoustical, optical and electrical development relative to sound motion pictures.

EDWARD P. CURTIS, vice-president of Eastman Kodak Co. in charge of motion picture film sales, has returned from a six-weeks trip to Europe and the Near East.

DANIEL R. CREATO, associated with the RCA legal division since 1935, has been named vice-president and general counsel for RCA Service Co. The latter company has expanded tremendously of late due largely to the upsurge of Tv with its many installation and servicing problems.

JOHN A. MIGUEL, JR., for the past four years general manager of RCA Victor Mexicana, has been appointed regional director for the Far East, headquartering in New York. He will be succeeded in Mexico by PAUL W. HESSINGER.



RALPH SOBELSON—Owner, Strand Theatres, Bangor, Pa.—writes:

"The regular check-ups by RCA Service technicians keep equipment in my theatres at top standards of performance."

To get the benefits of RCA Service—write: RCA SERVICE COMPANY, INC., Radio Corporation of America, Camden, N. J.

T. K. STEVENSON retired as of December 1 as the president and a director of Westrex Corp., subsidiary of Western Electric and distributor of motion picture equipment throughout the world except in the U. S. and Canada. He will be succeeded by F. R. LACK, now a director; while G. L. BEST will fill the vacancy on the board.

WALTER TESCH has been named merchandise manager for the RCA film recording group. Joining RCA in 1922, TESCH has served as broadcast engineer, development engineer, district service manager and in sales of electronic products.

CHARLES R. CRAKES, for the past five years audio-visual consultant with the DeVry Corp., Chicago, has been named educational director for that company. CRAKES has traveled to 46 states and 9 Canadian provinces to participate in more than 600 educational film conferences.

PAUL L. PALMERTON, assistant to the president of Western Electric Co., has assumed new duties with the firm as comptroller of the purchasing and traffic division. PALMERTON, who founded the publication *Rubber Age*, has been with W. E. since 1929.

Westrex Foreign Group Meets in N. Y.

Foreign managers of 18 Western Electric branch offices in 16 foreign countries have been in session at Westrex Corp. headquarters in New York for a joint survey of and consultation on the entire field activities of Westrex, including sales and servicing of all types of studio and theatre equipment, and other electronic apparatus.

The FCC has refused to grant an extension of the license of WTVJ, Miami Tv station now controlled by the Wometco Circuit. Charging that ownership of the station passed from the licensed parties to Wometco without FCC approval, the regulatory body has scheduled a hearing to determine why the station's license should not be revoked.

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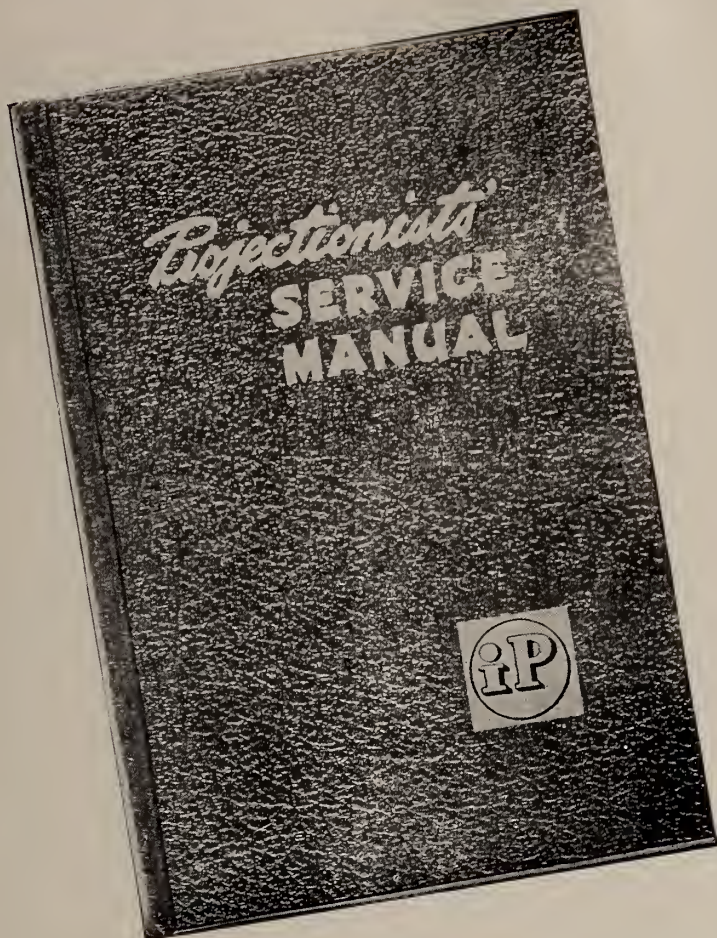
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Every projectionist should know the whys and wherefores of his projection room equipment. He should know what to do and what not to do when his equipment fails to function properly, and how to keep the show going until the service inspector arrives at the theatre. **PROJECTIONISTS' SERVICE MANUAL** is a

complete, compact compilation of everyday problems encountered in the projection room, and contains sound practical suggestions relating to their causes and how to remedy them. All items are grouped according to classifications, and many of them are illustrated with schematic diagrams.

A copy of this valuable trouble-shooter should be in every projection room for instant reference and as a trouble guide. Many I. A. Local Unions have placed a copy of this manual in each projection room. The price is right — only \$3 per copy, postage prepaid.

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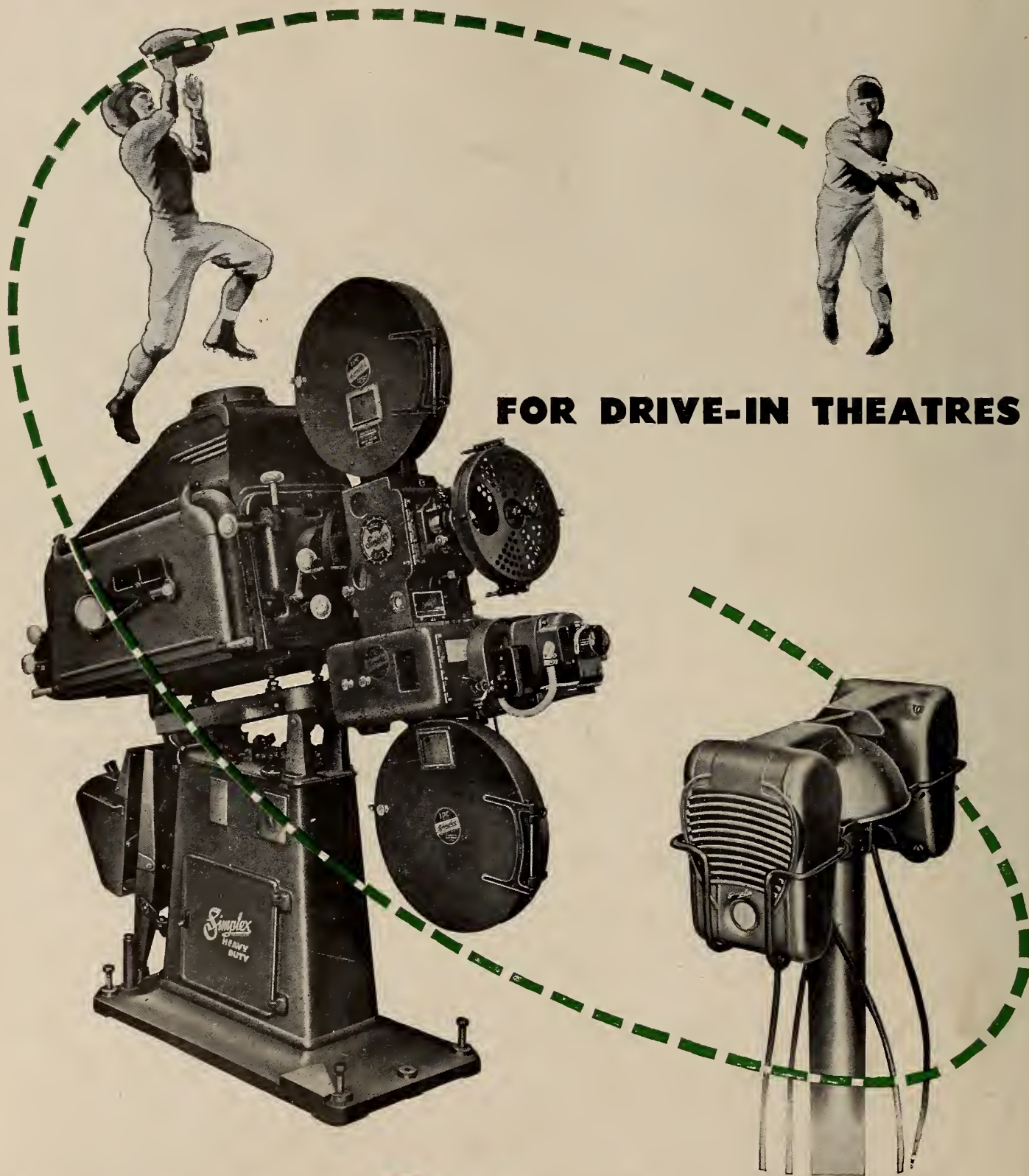
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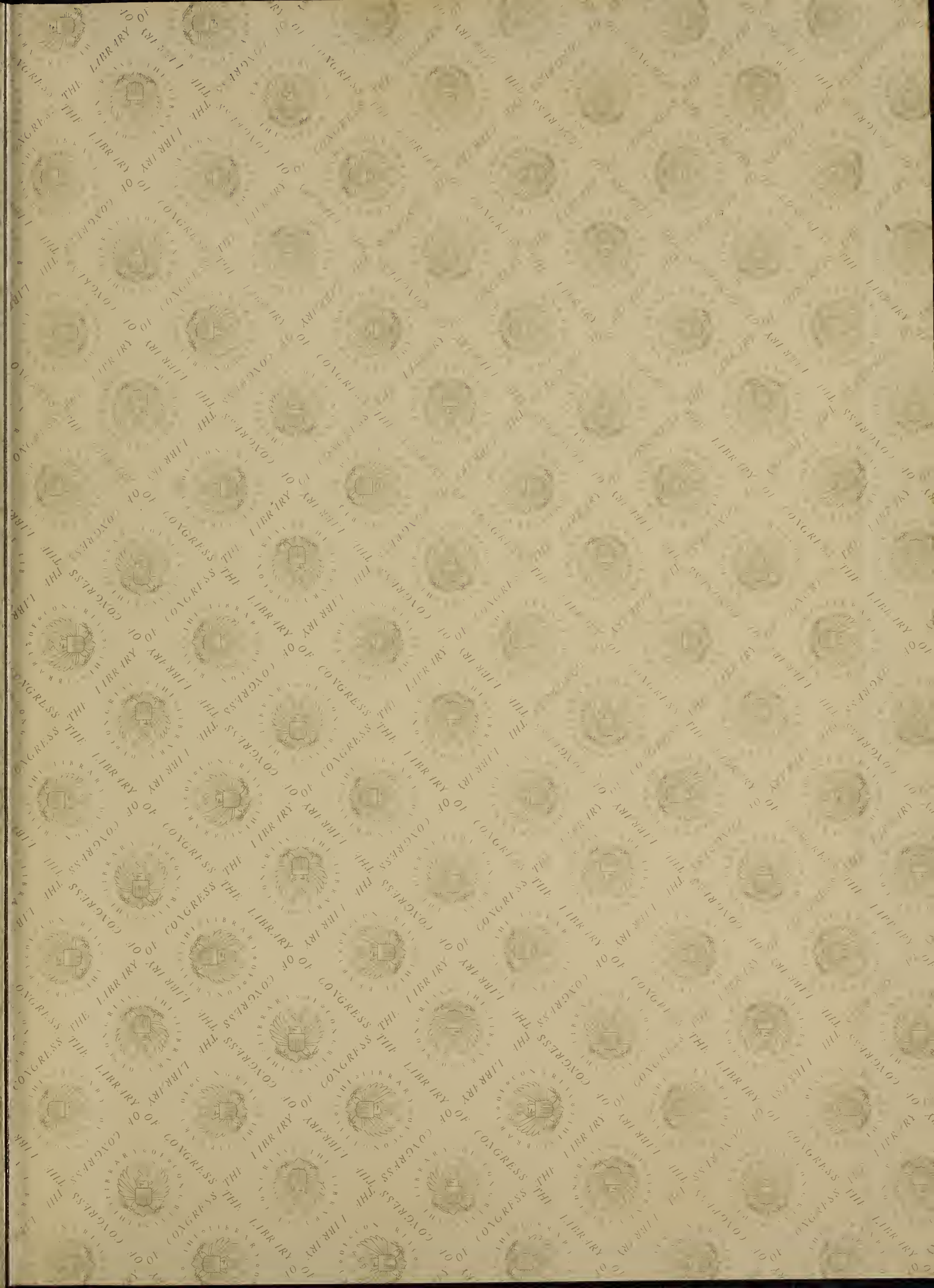
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